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the graphics people







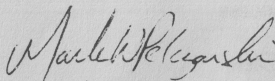
# The Complete Graphics System™

by Mark Pelczarski, David Lubar, Steve Meuse, and David Shapiro

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# Chapter 1 - Introduction

The Complete Graphics System is a set of graphics programs for people who aren't programmers. It offers almost every feature possible to let you create multi-colored graphics and text displays with your computer.

## What You Need

For the standard version of The Complete Graphics System you need an Apple with at least 48K of memory. With standard high-resolution graphics, the display screen is 280 dots wide and 192 dots tall, and you have a palette of 6 pure and 108 patterned colors.

To use the specially enhanced double-resolution version, you need an Apple IIc, or an Apple IIe with an extended 80-column card. This gives you a graphics screen that is 560 dots wide and 192 dots tall, with 16 pure colors and 256 blended colors.

## What It Lets You Do

With The Complete Graphics System you can, for example, design a house in three dimensions by drawing each of its faces separately on the screen. Then you can assemble the pieces and, by rotating the image, present several different views of the house, in true three-dimensional perspective.

You can fill in the sides of the house with your choice of colors (over 100 in standard high-resolution and 256 in double high-resolution) and add finishing touches to each picture using 96 different brushes. You can magnify portions of your pictures to edit point by point. You can even add text descriptions to the pictures anywhere on the screen.

Another feature included is the tricks program. This lets you create mirror images of your pictures, turn them upside down, move part of a picture to a different part of the screen, move part of one picture over to any part of another, or change all the colors in your picture. If you want, you can shrink your pictures so that four different views are shown at once.

Do not expect to sit down and master all of the capabilities of The Complete Graphics System at once. Even though each part is easy to use, it has many features. You will most likely be discovering new tricks and ideas for a long time. We hope you enjoy it, and let us know if you have any comments or suggestions.

## Use In Your Own Programs

Most of the graphics you create with this package are accessible for use in your programs. Instructions are included for how to use pictures, shape tables, and the text routine, and how to duplicate the 3-D file format from your own programs. You do need a license from Penguin to use the routines from The Complete Graphics System in other products for sale. There is no fee. Please write or call for further information.

## Input Devices

This program is compatible with paddles, joystick, trackball, mouse, Apple Graphics Tablet, Houston Instruments' HiPad and touch tablets such as the Koala Pad. Please contact your dealer for information on compatibility with other input devices.

## Other Compatible Programs

Penguin Software also has other related programs in which you may be interested:

Additional Type Sets gives you 50 large and small typefaces to use with The Complete Graphics System. They include Old English, Italic, Oriental, Barnum, Three-D, and many others, including language typefaces such as Hebrew and Russian.

Map Pack is a set of outline maps of the 50 states, the U.S., Canada and its provinces, and the continents. You can simply load the maps into The Complete Graphics System and add to them as you wish.

Paper Graphics is a utility which will let you print any high-resolution graphics screen to a printer. It works with hundreds of printer/interface card combinations. You can print any portion of the screen, magnify any area, print sideways, reverse, and more. It is compatible with the packed picture format of The Complete Graphics System, as well as standard format pictures.

Transitions lets you organize your picture disks into a professional presentation. It gives 44 choices of transitions, or screen wipes, between pictures. A hi-res picture catalog function is included that catalogs your picture disks on the graphics screen by showing miniature versions of the pictures on the disk. Transitions is compatible with standard format pictures and with the packed picture format of The Complete Graphics System.

The Graphics Magician is what the professionals use to put graphics in their own programs. It contains three animation editors for creating fast, smooth animation, and a picture/object editor that lets you create and store hundreds of specially-formatted multi-colored pictures on a single disk. It greatly simplifies the task of creating arcade games, graphic adventures, educational software, and any other graphics software.

Cat Graphics is a set of machine-language graphics routines that you can easily add to your Applesoft BASIC programs. It includes many of the machine-language routines used in The Complete Graphics System, including the color fill, packing and unpacking, text, magnification, line, and circle routines, with many others.

# Chapter 2 - Before You Start

## Backup Copies

The entire Complete Graphics System disk may be copied with any standard copy program. (Your Apple manual tells you how to make a backup copy). You must use a backup copy in your work instead of the original (also called the master). Also, if anything should happen to your backup, you can always make another copy. Be sure to keep your master disk in a safe place.

To prevent you from accidentally erasing the disk, the master may be on a disk that has no notch on the side. When a disk has no notch, or the notch is covered with a tab, the disk drive will not try to store information on the disk—what is called “writing to the disk.” This is why it is called a write-protect notch.

You must copy your master disk onto a disk which does have a write-protect notch in it. Some parts of this program require certain information to be stored on (written to) the master backup disk. Throughout this manual, when we refer to your master disk, we are talking about the backup of the master you are working with.

## Caution

The enclosed master disk has two versions of The Complete Graphics System on it. Each of these versions uses its own special Disk Operating System (DOS). It is very important that when you switch from using the standard high-resolution version to the double high-resolution and vice versa, that you turn off the computer and take the disk out of the drive. Then put the backup disk that has the other version of the program in the drive and turn on the computer again.

## Saving Your Creations

Any pictures or figures you create must be saved onto an initialized disk (called a data disk), not the (backup of your) master disk. Make at least one initialized disk before you start drawing, in case you want to save your work.

The main menu program has an option that will let you initialize a blank disk. Be sure nothing important is on the disk you initialize, as it will be erased.

## Your Registration Number

If you call with questions regarding this product, be prepared to provide the registration number stamped in the front of this manual. This is the same number that is encoded on your master disk. Be sure to send us your registration card, so we can send you information about improvements or updates to this program.

## Choosing Options

From any menu (set of options), press the key shown in parentheses to pick the option you want. Some letters will be shown with a “~” or CONTROL in front of them. Both are symbols representing the CONTROL key on the left side of your -9-



keyboard. To choose these options, hold down the CONTROL key and press the letter shown after the “” or CONTROL. (This is just like you would make a capital letter by holding down the shift key and typing a letter on a typewriter).

Some options are shown with a Closed Apple in front of them. To choose these options, hold down the Closed Apple key (just to the right of the space bar on the Iie and Iic keyboards) and press the letter listed after the Closed Apple.

To make this manual easier to read and understand, one-letter commands will be printed with their meanings. So, instead of “D” we use “(D)raw.” This will help you remember the meanings more easily.

When we use quotation marks in the text of this manual it is to set something apart. Do not type in any quotation marks. For example, if the manual says: Type “SAVE,” you would press just the S A V E keys. You would NOT type in the quotation marks.

## Terms and Conventions

Below are terms we will use in this manual and a brief description of how they are used here. Also listed are certain conventions used in this package and manual.

**Program** — The Complete Graphics System is made up of many programs all put together to form one large package. A Menu Program lets you choose which of the Complete Graphics System programs you want to run, such as the Drawing Program, the Text Program, and so on. When you are done with any of the programs, you can return to the Menu Program.

**Standard High-Resolution** — Apples with 48K can display two types of graphics, high-resolution (hi-res) and low-resolution (lo-res).

High-resolution means that there are many more points (dots that can be turned on or off) available on the screen. Apple hi-res has 280 distinct points across the screen and 192 points down the screen. In hi-res, there are six pure colors, although in this package we’ve “blended” over 100 combinations of these colors.

48K Apple lo-res has only 40 points across the screen and 48 points down, but has 15 distinct colors. Unfortunately, the blockiness of lo-res graphics make it poor for most applications. We do not use lo-res in The Complete Graphics System.

**Double High-Resolution** — To display double high-resolution (double-res) you need an Apple Iic, or Iie with an extended 80-column card. If your machine can display double-res, it can also display both standard hi-res and lo-res described above.

Double resolution is just that—twice the resolution of standard hi-res. It can display 560 dots across the screen and 192 dots from top to bottom. There are 16 pure colors (two grays) and we’ve blended them to give you a total of 256.

Double-res machines can also display double lo-res which has 80 x 48 dots and 16 colors. We do not use double lo-res in The Complete Graphics System.

**Graphics Pages** — The graphics screen is just an area of memory where the graphics are stored. There are two such areas of the Apple that can display hi-res or double-res graphics. These are called the two graphics pages and they are numbered 1 and 2. Most of the programs in the hi-res version of The Complete Graphics System use both pages. The double-res version appears to work the same as the hi-res version, but it is actually only using one graphics page.

**Cursor** — A cursor is a marker (like a square or an arrow) that you control and move around the screen.

**Screen Coordinates** — When you are drawing two-dimensional graphics, you will generally be shown an X,Y coordinate at the bottom of the screen. This is the location of your cursor on the screen. The upper left corner of the screen is the coordinate 0,0. The X location increases to 279 (559 in double high-resolution) at the right edge of the screen, and Y increases to 191 at the bottom of the screen.

**ESC** — The ESC (escape) key, unless otherwise stated, is used to toggle back and forth between showing the graphics screen with options listed at the bottom and full-screen graphics. Even when options show on the screen, you can still draw in that area. To see what you're doing, press ESC.

**Picture Format** — When we talk about picture format in this manual, we are talking about the format in which a picture is stored on a disk. In The Complete Graphics System there are generally two kinds of stored pictures: standard and packed.

On the Apple a standard picture is stored by having the computer remember every single dot of the picture—its color and location. This takes approximately 8K, over 8000 bytes (16K for double-res), of memory for each picture. About 12 pictures (7 for double-res) can be stored on a disk in standard format.

A packed picture is one in which dots of the same color which are next to each other are all stored as one set of information. Depending on how complex the pictures are you can easily store dozens of packed pictures on a disk. Of course, when you put these pictures into programs, you need to unpack them to show them on the screen. This is done automatically in The Complete Graphics System. If you want to unpack pictures from your own programs, there is an unpacking routine explained in the Programmer's Notes, Appendix D.

Each time you save a picture you have the choice of storing it in packed or standard format. "Packed" is always used unless you change it. You may change the format by pressing "(F)ormat." Press it once, and the format will be standard "8K IMAGE" ("16K IMAGE" in double-res). Press "(F)ormat" again and the format will return to "PACKED." You should only have to save a picture in standard format if you want to use it with a program from a company other than Penguin Software.

Standard format hi-res pictures are stored with the suffix ".PIC" automatically added to the file name by the program. Packed pictures have the suffix ".PAC" added by the program. Standard format hi-res pictures can be used as backgrounds for animation done with Penguin's The Graphics Magician.

In double-res Apples, half of the double-res page is in main memory, and the other half is in auxiliary memory. So, standard format double-res pictures are stored in two files, each with a suffix automatically added to the file name. The suffixes are “.DPM” for the main memory half of the picture and “.DPA” for the auxiliary memory half of the picture. Packed double-res pictures have the suffix “.DPK” added by the program. It is normal for a double-res picture to look peculiar for a few moments while saving or loading in standard format.

**Cataloging a Disk** — Cataloging a disk is what you do when you want to see the names of the files you have stored on a disk. After the file name, you will see the suffix the program has attached to it so you know which type of file it is. For example, “.PIC” at the end of a name means a standard format picture. “.TD” after a name means a three-dimensional graphics file. The suffix is always added automatically by the program; you never have to type it while using The Complete Graphics System. Press SPACE to see the rest of the file names and to return to the program after reviewing the catalog.

**Suffixes** — Each time you save something you have created, you give it a name. When you save these files, the program automatically adds a suffix to each file name. This is so when you catalog your disk, you will know, for example, that “HOUSE.PAC” is a hi-res packed picture (“HOUSE.DPK” would be a double-res packed picture) that can be edited with the two-dimensional graphics programs, and that “HOUSE.TD” is a 3-dimensional line drawing that must be used with one of the 3-D editors.

The suffixes given by each program are all listed in Appendix G.

**3-D Graphics Files** — 3-D files are not pictures. They contain information about a 3-D line drawing: the endpoints of all the lines, and which points to connect to other points with lines. The 3-D files can be created and edited with any of the 3-D programs in this package, and can be displayed and manipulated visually with the 3-D View Program. From this program you can save any view as a two-dimensional picture (hi-res: “.PIC” or “.PAC” / double res: “.DPK,” or “.DPA” and “.DPM”) format, and then edit the picture with any of the two-dimensional screen editors. A picture saved two-dimensionally, however, cannot be changed into a 3-D format. There is also a special 3-D Panel Editor that lets you create two-dimensional line drawings and save them in 3-D format, so you can assemble them later as 3-D figures.



# Chapter 3 - Getting Started

## Main Menu

After you've put the backup of your master disk in your drive and turned on the computer you will be shown the main options page, called the Main Menu. On it are displayed the following choices:

## Two-Dimensional Graphics

### Drawing

- (1) Position Joystick - also works for  
Paddles      Touch Pad      Trackball
- (2) Direction Joystick      (4) Mouse
- (3) Apple Tablet      (5) HiPad
- (T) Text      (R) Tricks      (S) Shapes \*
- (S) Standard to double-res conversion\*

## Three-Dimensional Graphics

- (P) Panel Creator      (V) View 3-D Figures
- (E) Point Editor      (L) Plotter

Below those are three other choices:

- (C) Color Bars
- (M) Modify Disk Access
- (Q) Quit
- (I) Initialize Data Disk

\*Depending on whether you are using hi-res or double-res version.

Below this is a line which says "Master Disk:D1 Data Disk:D1." This line will show what drive you specify for your master disk and data disk. The program comes set up for use with one drive. To change it, see Modify Disk Access.

Let's run through these three other options first, since you will most likely be using at least one of them before you actually start creating with the program. The seven main programs are covered in the following chapters.

## Color Bars

Choosing this option lets you see the pure colors.

In the hi-res version you will see six colors: green, violet, white, black, orange, and blue. In double-res you will see 16 colors: black, magenta, brown, orange, dark green, gray 1, light green, yellow, dark blue, violet, gray 2, pink, medium blue, light blue, aqua, and white.

Adjust your television or monitor so that you are getting the proper colors and an intensity that does not distort the edges. After making any adjustments, press SPACE to go back to the main menu.

## **Modify Disk Access**

This option allows you to modify the disk access routines. These let the computer know which disk drive to go to when saving or loading files. When you specify the location of your master and data disks, that information will be stored on your master disk. Every time you use this disk, the program will be set up for the disk access you want. However, you can change the information later if you need to. (If you go from using one disk drive to two, for example).

Use D for drive, S for slot, and V for volume when specifying locations of the master and data disks. Make sure you type in capital letters.

If you are using:

A single drive system — type “D1” for each. The program comes set up for a single drive system.

Two disk drives on one controller card or on a //c (the most common two disk setup) — use “D1” and “D2.”

If your drives are in more than one slot (two disk controller cards) — use “Sn” and “Sn” (where “n” is the number of the appropriate slot).

If you have a hard disk system, you may also use specifications like “V14” or “D23” depending on the type you have. If you are unsure what to put, contact your dealer.

## **Quit**

Quit gets you out of The Complete Graphics System altogether. An Applesoft prompt will appear. The computer will now accept commands in the BASIC language.

## **Initialize Data Disk**

This option lets you format a disk so it is set up to store the files you will be creating. This disk won't have any DOS on it, so you will have more room to save your pictures (about 32 extra sectors).

Any information on the disk you initialize will be erased. The program will tell you when to put in the disk you want to have initialized so you don't accidentally erase your Complete Graphics System disk.

The easiest way to get started is with the Drawing Program, so we suggest that you type 1, 2, 3, 4, or 5, depending on what input device you are using, and go on to the next chapter.

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# Part I — Two-Dimensional Graphics

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The programs described in this section have to do with the creation of two-dimensional graphics. Programs in Part II can create three-dimensional line drawings, and these too can be saved as two-dimensional images.

Two-dimensional images on the computer are simply a set of bytes stored in a display area of the computer's memory. These bytes contain information for each possible dot on the screen: whether it is on or off, and its color. When you save a two-dimensional picture, all that's saved is the section of memory in the display area of the computer. When that section of memory is loaded from disk back into the display area, your "picture" will once again be seen on your monitor.

When saved on disk in standard format, pictures take 8K of memory for hi-res, or 16K for double-res. What is remembered is a copy of that area of the computer's memory where the picture is displayed.

A packed format picture is a little more complicated. A "packing routine" in The Complete Graphics System looks for patterns and repetition in the display memory. It then stores a file on disk that contains codes describing the patterns it found. An "unpacker" will then decode those repetitions and patterns when the packed file is loaded again, restoring the original display memory from when the picture was saved.

The two-dimensional programs really only change information stored in the display area of the computer's memory. There are elaborate ways of changing this displayed information, as you will see. But remember: each thing you do just changes values that are stored in this display space, and saving and loading of standard picture or packed picture files simply saves and reloads this display area.



# Chapter 4 - The Drawing Program

To go to the Drawing Program, press the number of the controller you want to use as shown on the Main Menu. The Drawing Program lets you draw on the screen using 108 blended colors in hi-res or 256 colors in double-res, outline areas and fill them in, or use one of 96 brushes to put the color where you want. You may draw with lines, freehand, or with brushes. You can also make circles, arcs, ellipses, triangles, and boxes.

Files saved with the Drawing Program are always saved in packed picture format or standard picture format. Files loaded for editing with the Drawing Program must be in one of these formats.

## Controllers

Be sure your tablet, joystick, paddles, or other input device is plugged into your computer. If you have none of these controllers, you may still use this program by typing on the keyboard.

Since the Drawing Program works with so many different kinds of controllers, we will explain here how to use them. Later on in the instructions we will just say "use your controller" to do something. Follow the directions below for the controller you are using.

There are two different types of controllers. The first is external, which is something attached to your computer like a joystick or tablet. The second is keyboard.

If you start out using an external controller, you can switch to keyboard control and back.

### THERE ARE THREE THINGS YOUR CONTROLLER DOES:

1. Moves your cursor on the screen to draw.
2. "Puts things down," "Chooses" or Does things.
3. "Picks things up," or "Undoes things."

Look below to find the controller you picked. Then read about how to use it.

## Joystick

When you move your joystick, the cursor moves. Button 0 always "puts things down," "chooses," or "does things." Button 1 "picks things up" or "undoes things."

There are two kinds of joystick options available. The first is "Location Joystick," in which you can use your joystick to point at a location on the screen, and that is where your cursor appears. For Location Joystick, if you are using a joystick with self-centering, you may want to turn off the self-centering. This will make it easier to hold the joystick steady while you are drawing.

The other type of joystick control is "Direction Joystick," with which you point your joystick in a direction, and your cursor moves that way. The speed of the cursor is related to how far over you push your joystick, and if you push it all the way in a direction, how long you hold the joystick there. With Direction Joystick, you may want to turn on the self-centering of the joystick, if available on the joystick you own.

## **Paddles**

Paddle 0 moves the cursor left and right and paddle 1 moves it up and down. The paddle 0 button "puts things down," "chooses," or "does things." The paddle 1 button "picks things up" or "undoes things."

## **Trackball**

Moving the trackball moves your cursor. Button 0 "puts things down," "chooses," or "does things." Button 1 "picks things up" or "undoes things."

## **Touch Pad**

When you move the pen pointer in contact with the tablet, your cursor moves. Button 0 "puts things down," "chooses," or "does things." Button 1 "picks things up" or "undoes things."

## **Apple Graphics Tablet**

When you move the pen in contact with the tablet, the cursor moves. Pressing the pen down "puts things down," "chooses," or "does things." Pressing the RETURN or X key "undoes things."

In Draw or Brush modes, lifting the pen off the tablet will "lift the brush."

## **HiPad**

The HiPad must be in Stream mode. When you move the pen in contact with the tablet, the cursor moves. Pressing down the pen button "puts things down," "chooses," or "does things." Pressing the RETURN or X key "picks things up" or "undoes things."

In Draw or Brush mode, letting up on the pen button will "lift the brush."

## **Changing the HiPad Slot**

The disk comes set up for using a HiPad in slot 5. If you want to change the program to use the HiPad in a different slot, "(Q)uit" the program from the main menu and:

For the hi-res version type:

RUN HIPAD.SLOT.INIT

then press Return

For the double-res version type:

RUN DHIPAD.SLOT.INIT

then press Return

When asked, type in the number of the slot your HiPad is in and press RETURN. This information will be stored on the disk so you only have to do it once.

Each time you turn on the power of the Apple with the HiPad connected, you need to calibrate the HiPad in order to use it. To calibrate it, hold the pen in the lower left corner of the HiPad's surface about one inch from the left and two inches from the bottom. While the pen is there, press the RESET button on the HiPad. After a moment, the lights on the HiPad will come back on, and the calibration is done. Now press the STREAM button.

## Mouse

When you move the mouse, the cursor moves. Pressing down on the mouse button "puts things down," "chooses," or "does things." Pressing the RETURN or X key "undoes things."

In Brush or Draw mode, letting up on the mouse button will "lift the brush."

## Keyboard

You can use either the I J K M keys or the arrow keys to move the cursor. The arrow keys move the cursor in the same way they are pointing. If you use the I J K M keys, I is up, M is down, J is left, and K is right. The directions correspond to the layout of the I J K M keys on the keyboard.

Use the Z key to "put things down," "choose," or "do things." The X key "picks things up," or "undoes things."

Device	Movement	"do things"	"undo things"
joystick	stick	button 0	button 1
touch pad	pen movement	button 0	button 1
paddles	paddle knobs	button 0	button 1
trackball	ball	button 0	button 1
mouse	mouse movement	mouse button	RETURN, X, or release button
Apple Tablet	pen movement	pressing pen	RETURN, X, or lift pen
HiPad	pen movement	pressing pen	RETURN, X, or lift pen
keyboard	I J K M keys	Z key	X or RETURN key
	arrow keys		

## The Drawing Screen

At the bottom of the screen there are option lines which tell you what mode you are in and what your choices are. These options are listed and explained below.

Many of the things to do in the Drawing Program you choose from the Selection Screen. Those options are all explained in that section.

## EXTERNAL CONTROL

### Options Lines

The first item on the options lines says "EXTERNAL" which stands for all external control devices. If you switch to keyboard control it will say "KEYS."

### Z - Zero In

Z stands for "zero in." Pressing "(Z)ero" lets you zero in the movement of your controller to a small area around your cursor (40 dots by 40 dots). When you move your controller the entire length of its axis, the cursor only moves 40 dots, allowing you much better control. The word ZEROED will appear on the right above the text lines.

Not listed on the screen as one of the options is "(CONTROL-Z)ero," which will let you zero in to 8 dots by 8 dots. The word ZEROED will also appear in the same place.

To get out of either zeroed mode, press "(Z)ero" again, or "(N)ormal."

### 2, 4 or 8 - Magnification HI-RES VERSION ONLY

Magnify the area around the cursor, 2, 4, or 8 times to edit single dots by using your controller.

In the 4 and 8 times magnify modes, the magnified area is shown on the left. On the right, the same portion of the picture is shown in its actual size.

In all magnified modes, to change the color group in which you are plotting, press "(C)olor." You start by being able to plot in black, white, orange or blue. When you press "(C)olor," you can plot in black, white, violet or green. For more information about color on the Apple, see Appendix A.

To get out of any of the magnification modes, press "(N)ormal" or press SPACE to get to the selection screen. You may go back and forth among the three magnified modes by pressing the appropriate number. You do not have to go back to normal mode first.



## **AK - Go To Keyboard Control**

Press “(Control-K)eyboard” to control the cursor by the keyboard. Use keyboard control when you are trying to move the cursor very precisely. Some people also prefer keyboard control because of the added precision.

The rest of the options for external control, all of which are the same for keyboard control, are continued after the section on keyboard control.

## **KEYBOARD CONTROL**

The first item on the options line says “KEYS.” If you switch to external control it will say “EXTERNAL.”

## **ARROWS/IJKM - Cursor Movement**

The arrows or the I J K M keys move your cursor. Arrow keys move the cursor in the direction they are pointing. The I J K M keys move the cursor in the direction they are arranged on the keyboard. I is up. J is left. K is right. M is down. The arrows work with double-res only. With standard hi-res, use I J K M.

## **Z and X - Doing and Undoing Things**

Pressing “Z” lets you “put things down,” “choose,” or “do things.” The “X” or RETURN key (not shown on the screen), lets you do the opposite — “pick things up” or “undo things.”

## **1 to 9 - Length of Movement**

Pressing keys 1-9 let you control the distance (1-9 dots) the cursor moves each time you press the arrow or I J K M keys. You automatically start with 9.

## **Shift 2, 4 or 8 - Magnification HI-RES VERSION ONLY**

Hold down the SHIFT key when you press 2, 4, or 8. The unshifted number keys still control length of movement.

This option lets you magnify the area around your cursor 2, 4, or 8 times to change single dots by using your controller. It is explained fully above in the External Control section.

## **AE - Go To External Control**

“(CONTROL-E)xternal” shifts control back to your external controller.

## THINGS THAT ARE THE SAME FOR KEYBOARD AND EXTERNAL

### **SPACE - Selection Screen**

SP stands for SPACE. Pressing the SPACE bar lets you go back and forth from the Drawing Screen to the Selection Screen. The choices on the Selection Screen let you choose colors, how you want to draw (using lines, brushes, etc.), clear the screen, and get back to the main menu choices. Its features are described completely under Selection Screen.

### **ESC - Full-Screen Graphics**

ESC lets you toggle back and forth between full-screen graphics and the graphics screen with the options lines at the bottom.

### **C - Close-Up DOUBLE-RES VERSION ONLY**

“(C)lose-up” lets you magnify the area around your cursor so you can edit single dots. Plot and unplot points by using your controller. Press “(N)ormal” to go back to the Drawing Screen. You can choose a new center of the magnified portion and press (C)lose-up” again without going back to normal mode.

You can also go to the Selection Screen by pressing SPACE. Any options you select that do not apply to the close-up screen will take effect when you return to normal mode. If you are in “(T)hick” mode (described under Other Options) whatever primary color is chosen on the palette will be used for plotting on the close-up screen. For more information about color on the Apple, see Appendix A.

### **AR - Remember DOUBLE-RES VERSION ONLY**

“(AR)emember” and “(F)lopp” (described below) are companion commands. In addition to the 16K graphics page that you see while drawing, there is a 16K buffer (storage area) set aside to temporarily store a picture while you work on another on the Drawing Screen.

When you press “(AR)emember,” the program will store what you are looking at on the Drawing Screen. If you want to experiment on a picture in progress and are not sure that it will turn out right, “(AR)emember” it before going on. (You could also “(S)ave” the picture to a data disk as you go along, but this is faster). Then you can compare what is on the Drawing Screen now to the one you “(AR)emembered by using “(F)lopp.

#### **Note:**

When you begin using the Complete Graphics System anything can be in the “(AR)emember” buffer, so it’s not unusual to find strange things there. It is also possible to “(AR)emember” a picture, quit the program and play a double-res

adventure, like Transylvania or The Quest, then restart The Complete Graphics System, choose “(F)lopp” and pick up where you left off. We don’t recommend you make a habit of doing this, but if you happened to forget to “(S)ave” your picture to a data disk, and remembered before you turned off the Apple’s power, chances are the last picture you “(AR)emembered” will still be there.

## **F - Flopp DOUBLE-RES VERSION ONLY**

“(F)lopp” takes what is displayed on the Drawing Screen and has it trade places with what is “(AR)emembered in the buffer. Now the picture you were looking at is in the buffer and what was in the buffer is now on the Drawing Screen. Press “(F)lopp” again to switch back.

## **B - Black and White DOUBLE-RES VERSION ONLY**

If you are using a double-res RGB monitor, this feature is primarily intended for you. If you choose “(B)lack and white,” whatever line or fill color you selected will be ignored. Points plotted in this mode will be visible as 560-point, black and white resolution dots rather than 140-point color resolution dots. The difference won’t be visible on a non-RGB monitor. Pressing “(B)lack and white” again (or “(T)hick/thin,” which requires color) puts you back in the normal color mode you were in before selecting “(B)lack and white.”

When you choose “(C)lose-up” while in black and white mode, the dots will appear in black and white. You can press “(B)lack and white” again to flip back and forth between a color and a black and white close-up. If you are using a double-res RGB monitor you will notice that, like the normal magnification points and lines, close-up editing in black and white mode plots points in true 560-point resolution. With or without an RGB setup, this feature is very useful for doing fine point-by-point editing of details in a picture. Pressing “(T)hick/thin” will return you to the last color mode you were in when you are in close-up as well as normal mode.

For more information on the hows and whys of RGB displays and the double-res Complete Graphics System, see the Programmer’s Notes section.

## **Other Information Displayed**

The second options line lets you know your drawing mode. Below that is shown the number of the color you are currently using. The numbering system of the color palette is explained under Selection Screen. To the right of the color, the X and Y coordinates of your cursor location are shown.

## OTHER OPTIONS

These are not shown on the options lines, but you may use them when you are working on the Drawing Screen.

### H and V - Horizontal and Vertical Lock

Pressing “(H)orizontal” locks your cursor at the current Y coordinate. Moving your controller left or right slides the cursor along at that coordinate, making it easy to draw horizontal lines. Press “(H)orizontal” again to unlock the horizontal control.

Pressing “(V)ertical” locks the cursor at the current X coordinate, and moving your controller up or down lets the cursor move at that coordinate, making it easy to draw vertical lines. Press “(V)ertical” again to unlock the vertical control.

If you press both “(H)orizontal” and “(V)ertical,” the cursor is locked into place, but is not plotted. You can preview what your next move would look like if you plot it there.

### AS - Sound

Each time you plot a line, a point, a circle, etc. in the Drawing Program, there is a quiet click. To turn that sound off, or turn it back on again, press “(Control)Sound.”

### T - Thick and Thin Lines

Pressing “(T)hick/thin” lets you toggle back and forth between drawing thick or thin lines (or points in double-res) on the screen.

### D - Disk Options

You can go directly to “(D)isk options” (Save, Load, Catalog, Menu) from the Drawing Screen (or from “(C)lose-up” in double-res). These options are explained under the Selection Screen options.

## SELECTION SCREEN

From the Drawing Screen, press SPACE to get to the Selection Screen. From the Selection Screen, you may choose how you want to draw from the row of options at the top of the screen. You may also choose a color from the palette, or one of the other options listed on the side.

When you first see the Selection Screen, you will notice two stationary arrows. One is pointing at LINE on the top row and one is pointing at a square in the palette. These choices are what you automatically get when you go to the Drawing Program. One arrow will always point to a color on the palette and another to one of the options. The third (flashing) arrow you can move with your controller to change colors or options.



Remember, if you are using keyboard control, the arrow or I J K M keys will move your arrow. Press “Z” to select your options. Use “(CONTROL-E)xternal” to switch control if you want.

## PALETTE

### Hi-Res Version

Move the arrow to the color you want to use and use your controller to choose it.

When you use any of the options listed below, the color pointed to on the palette is the one used unless you change it. It makes no difference if you choose an option first and then a color or the other way around. The palette colors are numbered with #0 in the upper left corner, #1 below it, #2 below that, and so on. There are 10 colors in each column, so color #10 is to the right of color #0. The current color number is displayed in the options lines on the Drawing Screen.

Some of the colors on the palette might bleed into each other depending on where you put them on the screen. This is a characteristic of the way the Apple displays color. For information about this, please read Appendix A, “Color on the Apple.”

### Double-Res Version

Move the arrow to the color you want to use and choose it with your controller. Colors in the top row (the primary colors) are the ones you must use for Line, Draw, Circle, Arc, Ellipse, Box, and Triangle modes. Any of the colors on the palette can be used in Brush or Fill modes. If you choose one of the modes that can only use the primary colors, the arrow on the palette will automatically move to the top row. You will not be able to move it to any of the blended colors.

The palette colors are numbered with #0 in the upper left corner, #1 below it, #2 below that, and so on. There are 16 colors in each column, so color #16 is to the right of color #0. The current color number is shown in the options lines on the Drawing Screen.

## DRAWING MODES

### Lines

In the Line mode, you are in control of a flashing line on the drawing screen. One end is called the starting point. The end of the flashing line which you can move around the screen is called the endpoint.

You can move your starting point by “picking it up” with your controller. It will move to where the endpoint was.

At any time you can “put down” a line that connects that starting point to the movable endpoint. Each time you draw a line, the former endpoint becomes the new starting point.

## Draw

This lets you draw with a continuous line, like freehand drawing. “Pick up” and “put down” the cursor following the instructions for the controller you are using. Choose a line color from the palette and go. . .

## Fill

In the hi-res version you can fill on either a white background bordered by black, or a black background bordered by white. In the double-res version you must have a white background and black borders. For both versions the edge of the screen also acts as a border.

After selecting Fill, go to the Drawing Screen, move the cursor to the enclosed area, and use your controller to fill in (“put down”) a color. The color you chose will be filled upwards, downwards, and sideways until it fills within the borders.

You can always undo the last fill you did by “picking it up” with your controller.

To stop a fill in progress, no matter which input device you are using, press SPACE or any letter key. Sometimes, if a fill is accidentally positioned on one of the blended colors, it can keep trying to fill that color and get stuck in a loop. Stop the fill by pressing any key.

## Brush

When you go to the Drawing Screen the cursor is in the form of a brush. You can “put the brush down” (plotting) and “lift it up” (not plotting) with your controller. To see all the brushes available, see Select Brush, under Other Options.

## Drawing Mode

In Circle, Brush, Arc, Ellipse, Box, and Triangle modes, the “mode” line at the bottom of the Drawing Screen will tell you what the program is expecting. For example, in Circle mode, you are told you are in “Circle - Center.” After you choose the center, it tells you “Circle - Radius.” You can always go back to the last function by “undoing” the last choice with the controller button or key.

## Circle

Select Circle mode, and after going to the Drawing Screen, move your cursor to where you want the center of your circle to be and “put it down” with your controller.

You will then see a circle appear on the screen. Moving your controller right and left increases and decreases the radius of the circle. If you change your mind about where you want the center of the circle to be “pick it up” by using your controller.

When the circle is the size you want it, “put down” the circle by using your controller. You can make many circles using the same center if you want.

## Arc

In Arc mode, move the cursor to where you want the center of the arc to be (just like you made a circle above) and “put down” the center of the arc by using your controller.

You then control where the radius of the arc is by moving your controller. When the end of the line is on the perimeter of where you want the arc to be, “put down” the cursor. Then, by using your controller, you can plot the points of the arc. You can pick up the cursor and put it down anywhere along the path of the arc. The arc can continue as far around as you want it — you can even make a whole circle (although using the circle mode is much easier).

## Ellipse

In Ellipse mode, you draw in almost the same way arcs are drawn, except an ellipse has two “centers,” each of which is called a focus. To draw an ellipse, position the cursor where you want one of the foci and “put it down” using your controller. Now choose the second focus the same way.

Then move the cursor to a point on which you want on the path of the ellipse itself (you’ll be controlling the third corner of a triangle) and use your controller to “put down” the cursor. Use your controller to plot points around the ellipse. You can “pick up” the cursor and “put it down” again while you are drawing an ellipse and still stay on the ellipse path.

## Box

On the Drawing Screen move the cursor to where you want one of the corners to be, then “put it down.” A box will appear that can shrink, expand, and change proportions depending on how you move it around with your controller. Use your controller to put down the box when it is where you want it.

## Triangle

Go to the Drawing Screen, move the cursor to where you want one of the corners to be and “put it down.” Then put down the end of the flashing line where you want the second corner to be. Now put down the triangle where you want it. You can always back up by “picking up” the previous corner.

## OTHER SELECTION SCREEN OPTIONS

These are the options listed on the left side of the selection screen:

### Go to Draw

This takes you to the Drawing Screen. You may also just press SPACE to do the same thing.

## Select Brush

A set of 96 brushes is shown. The brush your cursor is pointed at will blink. After you use your controller to select a brush, you automatically go back to the Selection Screen. The arrow on the top line has moved to BRUSH, (if you haven't moved it there before).

## About the Brushes

The four sets of five brushes in the second and third rows seem similar. Notice the largest rectangular brush in the second row. The little brushes all have to take up the same block of space when they are created, even though only a point or small area of points are actually being plotted. The brushes in these sets are located in a corner of the large block area.

It would only make a difference which brush of these similar ones you choose if you were drawing right up to the edge of the screen, or in one of the corners. Then only one set of these brushes would reach. Of these sets, the first set of five will reach the upper-left corner; the second set will reach the upper-right corner; the third set, the lower-left corner; and the fourth set, the lower-right corner.

## Clear Screen

This option lets you clear the Drawing Screen so you can start over. Make sure you pick the color you want the screen to be before choosing "clear."

Be sure to save anything you want to keep. If you clear the drawing screen without saving the picture to a data disk, you will not be able to see or use it again. (Unless you "(R)emember" it — in double-res version only).

## Disk Access

You have the following options:

### Save

Use this to save the drawing that is currently displayed. It will automatically be saved in packed format unless you specify otherwise. See "Format".

Make sure your data disk is in the proper drive, type in a name, and press RETURN.

### Load

This loads a packed or standard picture into the Drawing Program. The picture must have been saved with the Drawing Program or any other program in The Complete Graphics System that will save in standard or packed format. Make sure the current format matches the format of the file you want to load. See "Format".

*Hi-res Version Only - Pictures saved in standard format from other programs can be loaded as long as the name ends in ".PIC." You can use the RENAME function in DOS to change the name of a file so it ends with ".PIC." See your DOS manual.*



## Draw

“(D)raw” takes you back to the drawing screen.

## Catalog

“(C)atalog” lets you catalog your data disk.

## Menu

“(M)enu” returns you to the Complete Graphics System’s Main Menu.

## Format

Pressing “(F)ormat” allows you to choose the format you want your picture to be saved in: Packed or Standard. The current format is always displayed on the screen, and “(F)ormat” just toggles between the two choices.

**Hi-res Version** — The suffix “.PAC” is automatically added to the names of packed picture files names, and the suffix “.PIC” is added to file names of standard 8K pictures.

**Double-res Version** — The suffix “.DPK” is automatically added to packed picture file names and the suffixes “.DPM” and “.DPA” are added to the file names of standard 16K pictures.

# Chapter 5 - The Text Program

The Text Program allows you to type on a blank screen or on your pictures, using either a normal size character set (font), or a larger set twice as tall and wide.

Any character may be typed in any of the primary or blended colors, although a few of the colors will not give enough resolution to produce good results, especially with the small characters. Black or white are recommended for the small characters. In the hi-res version, the best to use are whites #52 or #77, or blacks #53 or #80.

A small and large character set are loaded automatically when you go to the Text Program, but you can also create your own characters or character sets. You can also load in any of the alternate sets available in our Additional Type Sets package.

Text may be placed at any location on the screen by using the keyboard to precisely position the cursor. You are not limited to placing text on specific rows or columns. The text itself may be plotted so that it reverses the background color, is placed over the background color (non-destructive), or is placed over a black background at the cursor position (destroying the background color).

The Text Program uses the following types of files:

Hi-res version — standard 8K (.PIC) and packed pictures (.PAC)

Double-res version — standard 16K (.DPM/.DPA) and packed pictures (.DPK)

These pictures can be used for the background and can be saved in the same format after you've typed on them. Small type sets (.STS) and large type sets (.LTS) can be loaded for typing or you can create sets and save them to use later. Both hi-res and double-res versions use the same type sets.

Text Program options:

Type	Edit Typeset
Load Picture	Clear Screen
Save Picture	Menu
Get Typeset	Catalog
Keep Typeset on Disk	Format

## Type

Any picture that was on the screen when you went to the Text Program will remain on the screen. If you want to type on top of another picture that you have saved, you will have to load it onto the screen. Jump ahead to Load Picture and come back here. You may also type on a blank screen.

After selecting "(T)ype," the options lines displayed at the bottom of the screen will show the current size, color, mode, and the X,Y coordinates of your rectangular cursor. Any characters you type which are not commands will show up in the position of this cursor. You should find that you are using the small font, in reverse mode, with color #77 in hi-res or #224 in double-res, which is white.

When you reach the end of a line, the cursor will advance to the beginning of the next line. When you reach the end of the screen (underneath the options lines) the display will not scroll and the cursor will wrap around to the last line of the screen again.

## Help Screen

The top options line says "Control-H for Help" (Closed Apple-Help in double-res). This gets you to a Help Screen that lists the control commands available to you. It is handy as a quick reference. All the commands are explained below.

To use any of these options, you must hold down the CONTROL key (in double-res use the CONTROL or Closed-Apple as specified) while pressing any of the single-letter commands. Before typing any of the control commands, you must go back to the drawing screen by pressing SPACE or any letter key.

## Cursor Movement by Character

**Hi-Res Version** — The CONTROL-I, CONTROL-J, CONTROL-K, and CONTROL-M commands move your cursor up, left, right, and down, respectively, just as they appear on the keyboard. These keys move the cursor one character position. The CONTROL-J also works as a backspace.

**Double-Res Version** — Hold down the Closed-Apple key and press one of the arrow keys to move the cursor one character position. The DELETE key also works as a backspace.

## Cursor Movement by Dot

These commands let you move the position of the cursor one dot at a time. With this type of control, you can easily put text anywhere on the screen with minimum effort, reduce or increase spacing between certain characters to fit something in a small space or for emphasis, or create subscripts and superscripts.

**Hi-Res Version** — The CONTROL-T, CONTROL-V, CONTROL-F, and CONTROL-G keys also move the cursor up, down, left and right respectively, just as they are arranged on the keyboard.

**Double-Res Version** — Press any of the four arrow keys to move the cursor position one dot. (Do not use CONTROL or Closed-Apple).

## Small and Large Fonts

"(CONTROL-S)mall" lets you type with currently loaded small font, and "(CONTROL-L)arge" lets you type with the currently loaded large font. Normally these are the small and large type sets that come with The Complete Graphics System, but you can load others using the Get Typeset option from the Text Program options.

## Destructive, Nondestructive, and Reverse Type

You may choose your typing mode with the commands:  
“(CONTROL-D)estructive,” “(CONTROL-N)ondestructive,” or  
“(CONTROL-R)everse.”

Destructive is the only mode that creates its own background and therefore can be used with most colors. A black rectangular box is created around the character you type. Pressing SPACE creates a black space for continuity. Destructive is also the only mode that allows true backspacing and correction using CONTROL-J (hi-res) or DELETE (double-res), since the background that it puts down will wipe out previous mistakes. If letters are put too close to one another, one letter's background may overwrite part of a previous letter.

The readability of the characters in the other two modes depends on the background color. Generally, you'll get better results with colors close to the primary Apple colors.

When you type in characters in Nondestructive mode, the characters are simply put right on top of the picture you are typing on. The background is only affected in the dots of the actual character. Backspacing for corrections cannot be done.

When you type in Reverse mode, the characters you type in will be the reverse of the background color; that is, within the dots of the character, screen dots that were on will turn off, and screen dots that were off will turn on. Black and white will reverse, as will blue and orange, and green and violet. To backspace and correct in Reverse mode, you should use CONTROL-J in hi-res or DELETE in double-res, then type the mistake again. This re-reverses it to the original background. Then backspace again with CONTROL-J or DELETE, and type what you wanted.

## Color

“(CONTROL-C)olor” gets you to a palette screen which contains the same colors as in the Drawing Program. These colors work best when you are using a large character set. With the small letters, it's better to stick with black or white.

To pick a color, use the I J K M keys (double-res can also use arrows) to move the cursor until the arrow is on the color you want. (Hi-res note: do not use the CONTROL key here). When the arrow is on the proper color, press SPACE to get back to the writing/drawing screen. Now anything you type on the screen will appear in the color you have just chosen.

## Horizontal and Vertical Spacing

Horizontal and vertical spacing may be changed with the CONTROL-X and CONTROL-Y commands. These commands allow you to use nonstandard sized fonts, any size character smaller than 14 dots wide by 16 tall, and to vary the spacing between letters and lines for compacting or for emphasis.



**Hi-Res Version** — The standard horizontal spacing (which you get automatically) is 7 dots with the small font and 14 dots with the large font. Standard vertical spacing is 8 dots for the small font and 16 dots for the large.

**Double-Res Version** — The standard horizontal spacing (which you get automatically) is 14 dots with the small font and 28 dots with the large font. Standard vertical spacing is 8 dots for the small font and 16 dots for the large font.

## **Font Expansion — DOUBLE-RES VERSION ONLY**

To use the same large and small fonts that the hi-res version uses, the Text Program expands each byte of character data to two bytes before displaying it on the screen. Pressing “(⌘)xpansion” turns this expansion process on and off, allowing you to type half-wide characters with finer details. By using the “(⌘)xpansion” option in combination with the small and large type sets, you can type in 80-, 40-, and 20-column text. The Font Expansion is on when you first go to the the Text Program.

## **Options**

“(CONTROL-O)ptions” gets you back to the Text Program options.

## **Typing in Upper Case HI-RES ONLY**

**Using the Apple //e and //c Shift Key** — If you are using the Apple //e or //c, pressing CONTROL-E will let you capitalize by using the shift key. After using CONTROL-E, release the caps lock. Now you can use the keyboard for upper and lower case as it is intended. When you go back to the options screen, you will have to press down the caps lock key again. Also, now you only need to press ESC once to toggle between showing the options lines and full-screen graphics. (See below).

**Upper Case on other Apples** — The ESC key has two separate functions in the Text Program. One is for capitalization and the other is to allow you to view full screen graphics. When you are typing on the screen, pressing a letter key by itself gives lower case; a letter key preceded by ESC gives the upper case character. You must press ESC before EACH letter you want capitalized.

Pressing ESC twice eliminates the options lines and shows you the full graphics screen. Pressing ESC twice again gives you the options lines back.

Pressing ESC followed by any number gives the character shown in Appendix B (which gives all the ASCII codes, characters and which key combinations display them). Use ESC in this instance just like you do for capitalization. Press ESC, then press the number key.

If you have a shift-key modification on your Apple, it is possible to use it while typing instead of ESC to get capitals, but we do not advise doing so. Usually it is difficult for you to get back to standard mode easily, and this will affect later input. If you do want to use it, however, press CONTROL-E (as above) and then the shift key for capitals.

**Typing Capitals and Lower Case DOUBLE-RES ONLY** — Use the SHIFT and CAPS LOCK keys as you normally would on a typewriter. This typing part of the Text Program is the only part of The Complete Graphics System where these keys are important. In all other parts of the programs for commands, file names, etc., the programs will understand if you type in upper or lower case.

## Other Text Program Options

### Load Picture

Make sure the data disk with your picture is in the proper drive. Type in its name and press RETURN. Make sure the format toggle is set for the correct type of picture, standard or packed. (If you do not remember the name or format of the picture you want, see Catalog).

### Save Picture

Make sure your data disk is in the proper drive. Type in a name and press RETURN. Your picture will be saved in packed format unless you change it. See the instructions under Format.

### Get Typeset

This option is for loading a typeset that you have created. You will be asked if you want a small or large font. Type in "(S)mall" or "(L)arge." Then type in the name of the typeset you want. Be sure the disk with the type set is in the proper disk drive before pressing RETURN. Small typesets have the suffix ".STS"; large typesets have the suffix ".LTS."

Remember, you do not need to use this option to get the standard typesets which come already on your Complete Graphics System disk, unless you've loaded another in and want to get a standard typeset back. The names of the typesets that come with your Complete Graphics System are "Small" and "Large."

### Edit Typeset

After choosing "(E)dit," you will be asked if you want to edit a small or large typeset. Press "(S)mall" or "(L)arge." Then the entire set of characters including numbers and other symbols will be shown on the right half of the screen.

You now have three choices: to create a character, edit a character, or press RETURN to go back to the Text Program options.

**Create or Edit** — A grid of dots, 7 x 8 for a small font, 14 x 6 for a large font, will be displayed in the upper-left corner of the screen. Each dot represents a point in a character that can be turned on or off.

If you choose to create a character, the grid will be empty.

If you want to edit a character, you will be asked which one you want to edit. After you type in the corresponding keystroke, that character will be shown on the grid and below it in real size.

**Keystrokes** — When you “(S)ave” or “(E)dit” a character, you will be prompted to specify the character which you want your new character to take the place of. To do this you must specify the keystroke(s) normally used to get that character. For example, if you wanted to save or edit the numeral “1,” you would press the “1” key.

*Note:*

*Hi-Res Version* — If you are editing an upper-case letter of the alphabet, you will have to press the key combination that you normally use in the Text Program to get that letter. If you have an Apple older than the //e, you would precede the letter with an ESC to designate a capital. If you have a //e or //c, and if you’ve already used the CONTROL-E option to specify so, you may release the CAPS LOCK and type the character just as you would normally.

Note that in either version you are not limited to making variations on the same symbol. You can create a new lower-case “t” and save it to take the place of the lower-case “t” in the type set. Or, if you’re a little more bold, you could create a circle and save it under the keystroke 1. This would mean that when you are using this type set, every time you press the “1” key, a circle would appear.

**Editing** — You will use the following commands whether you are creating or editing:

**Cursor Movement** — In the hi-res version the I J K M keys move the cursor up, left, right, and down respectively. Use the arrow keys in the double-res version.

The cursor will wrap around the grid in all four directions. For example, if you move up past the top, the cursor reappears at the bottom.

**Plotting** — To turn the plotting on, press “Z”; to turn it off, press “X.” A circle will appear around the points you have turned on.

As you are creating the character it will appear in “real” size below the grid. (In double-res it will be shown expanded). That way you can see exactly what the character will look like.

**Save** — When you “(S)ave” a character, you must specify which character you want it to take the place of by typing in the corresponding keystroke(s). After you save it, it will appear in the type set in the place of the character normally used with that keystroke.

However, saving the character is only temporary. If you want to keep the type set to be able to use later on, you need to use the Keep Type Set option. See below.

**Quit** — You can “(Q)uit” creating or editing the character you were working on, and start over. When you quit, the character you were editing does not take the place of one in the type set nor is a character added to the type set.

## Keep Typeset

“(K)eep typeset” from the main options lets you save a type set you have created. We called it “keep” instead of “save” because we are already using “save” to save pictures.

Specify whether you want to save the “(L)arge” or “(S)mall” set. Then give your new set a name. Be sure your data disk is in the proper drive before you press RETURN. Pressing RETURN instead of selecting a name will let you return to the Text Program options.

## Clear Screen

“(CONTROL-C)lear” lets you clear the screen to black. You do not have to clear the screen before you load a picture.

## Main Menu

Pressing “(M)enu” takes you back to The Complete Graphics System’s main menu.

## Catalog

“(C)atalog” lets you catalog your data disk.

## Format

Pressing “(F)ormat” toggles between packed and standard formats. The current format is shown on the options lines.

# Chapter 6 - The Tricks Program

The Tricks Program lets you change colors, make mirror images of your pictures, move parts of your pictures to others, and shrink your pictures. It uses either packed or standard picture files. In the hi-res version these are .PAC or .PIC files. In the double-res version they are .DPK or .DPM/.DPA.

## Graphics Pages 1 and 2

**Hi-Res Version** — Except for this program, you've only been editing page 1 of graphics. Page 2 has only been used for displaying options available to you. With the Move, Transfer and Shrink options of the Tricks Program you will also be using graphics page 2.

**Double-Res Version** — Double-res really has only one true graphics page. Even so, the double-res version of the Tricks Program will seem to work the same way as the hi-res version. This is done by maintaining areas in auxiliary memory for each of two pages, and moving them in and out of the "display page" area as needed. You may notice a very brief "mix" of the images as the two pages exchange places. This is normal. For clarity's sake, we'll refer to these two pages as if they were actually two separate graphics pages.

## Options

The Tricks Program options are below. To load a picture onto the screen, go to Disk Options first.

Flip	Full Screen
Color	View Other Screen
Move	Shrink
Transfer	Disk Options

## Flip

The "(F)lip" option flips the screen image in the ways described below. After the flip is performed, you automatically return to the Tricks Program options. The colors in the pictures remain the same in all these moves.

"(A)ll" flips the entire picture left/right across the screen.

"(L)eft" makes a mirror image of the left half of the screen onto the right.

"(R)ight" makes a mirror image of the right half of the screen onto the left.

"(T)op" makes a mirror image of the top half of the screen onto the bottom.

"(B)ottom" makes a mirror image of the bottom half of the screen onto the top.



“(U)pside down” makes the entire picture turn upside down.

ESC lets you toggle back and forth between the graphics screen with options lines at the bottom and full-screen graphics.

RETURN takes you to the Tricks Program options without changing the picture in memory.

## Color: Hi-Res Version

These options let you change all the colors in your picture. Every color change is reversible by pressing the same key again except “(L)eft” and “(R)ight.”

1 2 3 4 are predefined color swaps that affect the entire picture. Each is reversible by repeating the same number.

With color swap 5 you can define your own color change. (See Change Colors for #5 below). Then when you press 5 all the colors in the picture are changed as you specified. It, too, is reversible by repeating 5 again.

ESC lets you toggle back and forth between the graphics screen with options lines and full-screen graphics.

RETURN gets you back to the Tricks Program options with no change to the picture on the screen.

“(A)ll” flips the entire screen right/left and changes all the colors.

“(L)eft” makes a mirror image of the left half of the screen onto the right and changes all the colors on the right side. The colors on the left remain the same.

“(R)ight” makes a mirror image of the right side of the screen onto the left and changes all the colors on the left side. The colors on the right remain the same.

**Change Color for #5** — After you press “(C)hange color” you will be asked for two numbers between 1 and 255. The first number is the color flip that will affect all even bytes on the screen. The second number will affect all odd bytes on the screen. Because of the color makeup of the Apple screen, the same color will have different values stored in even and odd bytes. Color flip 5 is mostly for amusement. We already predefined the four flips that will give consistently good results. Technically speaking (if you are interested), the numbers you give here for flip number 5 are the values that will be exclusively or’d with the screen values to give the new screen.

## Color: Double-Res Version

These options let you change all the colors in your picture. Every color change is reversible by pressing the same key again except for “(L)eft” and “(R)ight.”

“(F)lip color” lets you choose one of 16 color swaps. Each is reversible by choosing the same number color flip again. To flip the screen colors, press “(F)lip color,” then a number from one to 16 and press RETURN. With color flip #16, you define the color flip. See below.

ESC lets you toggle back and forth between the graphics screen with options lines and full-screen graphics.

RETURN without typing a number lets you go back to the Tricks Program options with no change to the picture.

“(A)ll” flips the entire screen right/left and changes all the colors.

“(L)eft” makes a mirror image of the left half of the screen onto the right and changes all the colors on the right side. The colors on the left remain the same.

“(R)ight” makes a mirror image of the right side of the screen onto the left and changes all the colors on the left side. The colors on the right side remain the same.

**Change Color for #16** — This lets you define the color values for the flip. Then, when you choose color flip 16 the colors will change according to the values you specified.

This flip is mostly for amusement and is reversible by choosing color flip 16 again.

After you press “(C)hange color” you will be asked for four numbers between 1 and 255. The first number is the color flip that will affect all even bytes in the auxiliary memory image, the second number will affect all even bytes in the main memory image, the third will affect all odd bytes in the auxiliary memory image and the fourth number will affect all odd bytes in the main memory image. Because of the way color is represented in double-res, these four bytes will all have different values when displaying the same color. (Technical note: The numbers you give here will be exclusively ORed with the screen values to give the new screen).

There is one useful application of color flip #16 for those using a double-res RGB 80-column card or attachment for their Apple IIe or IIc. The double-res Complete Graphics System and the double-res version of The Graphics Magician Picture Painter both initialize these RGB peripherals to their “mixed mode” state. This means that the most significant (or “high”) bit in each displayed byte is used to determine whether the remaining seven bits will be displayed as black and white (560-point resolution) or color (140-point resolution).

In “normal” (composite video) double-res, the high bit is ignored. Without this “mixed mode” it would not be possible to mix color graphics and sharp-looking black and white text on an RGB monitor. Color flip #16, if defined as 128, 128, 128, 128, will flip all the high bits in the picture. On an RGB monitor, this will make colored areas black and white, and black and white areas colored.

## Move

This option lets you move a rectangular section of a picture from either graphics page 1 or 2 onto page 1. (If you want to move an entire screen, see Transfer).

**Source and Destination** — The “source” is where the part of the picture is coming from. The “destination” is where it is going. You are first asked if you want to move your picture from page 1 or from page 2. The destination will always be on

page 1. (When you move part of a picture to page one it will wipe out whatever was at that place on the screen. Make sure any picture you want to keep is saved).

Pressing 1 or 2 will take you to the appropriate screen.

You have separate control over the upper-left and lower-right corners of the source box (the area that you are moving somewhere else). The source box is the one with the arrows pointing out, since you are moving this out. When you first select "(M)ove" you are controlling the upper-left corner of the source box. Press SPACE once and you control the lower-right corner of the source box. Press SPACE again and you see the destination page and box and have control over the destination box. The destination box has the arrows pointing in, since you are moving into it. Press SPACE again and you have control over the upper-left corner of the source box, and so on.

**Page 1 to Page 1** — If you are moving from page 1 to page 1, you will see both your source box and destination box on the screen at the same time. The destination box will change size as you are changing the source box.

**Page 2 to Page 1** — When you control the source box you will see it by itself on page 2. When you control the destination box, you will be switched back to page 1. The destination box will be the same size as the source box. You just need to move the destination box to where you want it.

**Movement DOUBLE-RES ONLY** — Use the four arrow keys to move the boxes around the screen. Holding down the Closed-Apple key while pressing an arrow key will let you move the corner or box 8 times as far as pressing an arrow key by itself. Note that when you control the destination box, movements to the left or right are restricted to larger jumps (28 dots, or 4 bytes) than the source box can take. This is to preserve the color of the source box.

**Movement HI-RES ONLY** — Use the IJKM keys to move the boxes around the screen. Pressing the Z key will let you toggle the zero-in feature for the vertical control. Horizontal movement is restricted to certain boundaries to preserve color.

When you press RETURN the section of the picture in the source box will be moved to where the destination box is. Pressing the ESC key will let you go back to the Tricks Program options with no change to your picture.

## Transfer

The Transfer option lets you move the entire screen of graphics from graphics page 1 to page 2 and vice versa. The first question you must answer is if you want to transfer:

Page (1) to page 2? or  
Page (2) to page 1?

Your choices are in parentheses. Pressing 1 takes what is on page 1 and puts it on page 2. Pressing 2 takes what is on page 2 and puts it on page 1. Note that you will wipe out whatever is on the page you are transferring to, so make sure you have your picture saved before you put something over it.

If you press RETURN without typing in a response to the above questions, you will go back to the Tricks Program options with no change to the picture on the screen.

## Full Screen

ESC toggles back and forth between page 1 graphics with options at the bottom of the screen and full page 1 graphics. Options are only shown at the bottom of page 1, never on page 2.

## View Other Screen

Pressing the SPACE bar lets you toggle back and forth between viewing the two graphics screens.

## Shrink

In the shrink option you always shrink what is on page 1 to page 2. This option will allow you to take a full screen and shrink it to  $\frac{1}{4}$  size.

**Which Corner** — Press the number of the corner of the page 2 screen on which you would like the shrunken picture.

**Intensity** — This changes contrast of the new image. 1 is the least intense (the fewer dots set) and 4 is the most intense (the most dots set).

**Keep Shrinking** — To create an even smaller picture, use the Transfer option to put your shrunken pictures on page 1, then shrink them onto page 2 as many times as you like.

## Disk Options

You may "(L)oad" a picture onto the screen. Make sure your data disk is in the proper drive. Then type in the name of the picture and press RETURN. Make sure the format toggle matches the type of picture you are loading. You will be asked if you want to load the picture onto graphics page 1 or 2. Press 1 or 2. Pressing RETURN without typing in a response to either of these two questions will return you to the Disk Options.

"(S)ave" lets you save the picture displayed on page one in the current format.

"(C)atalog" lets you catalog your data disk.

-40- "(M)enu" lets you go back to the main menu of The Complete Graphics System.

RETURN will let you go back to the Tricks Program options with no change to the picture in memory.

ESC toggles between the graphics screen with the options lines at the bottom and full-screen graphics.

Pressing "(F)ormat" toggles back and forth between Packed and standard 8K format.



# Chapter 7 - The Shape Program - Standard Hi-res Only

This program lets you create and save Apple "shape tables." The Apple computer has the capability of storing graphics objects called shapes, several of which make up what is called a shape table. These shapes are only designed to be used with standard hi-res and with Applesoft BASIC. They will not work with double hi-res.

The Shape Program lets you create shapes, rotate and scale them, and move them anywhere on the screen. You can plot these shapes on any picture in any of the standard Apple colors, or save them for use in your own programs.

The following are the Shape Program options:

Add Shape	Replace Shape	Delete Shape
View Shape	New Table	Get Table
Keep Table	Load Picture	Save Picture
Clear Picture	Menu	Plot
Catalog	Format	

## Add Shape

There are two ways to design a shape: in actual size or in magnified mode. In magnified mode you draw the shape in large low-resolution graphics and the program will convert it into a high resolution shape. Creating a shape in magnified mode is easier, but a shape made that way will usually take a little more memory when you save it. Once you have created a shape, you automatically have a shape table. Each shape you create is added to that table, or you can load a previously-created table from your data disk and add to that one.

## Creating Shapes in Magnified Mode

When you create a shape in magnified mode you must first designate a width and height for it. Type in an even number between 2 and 38 for each. This number designates the number of points in width and height that your shape will be. Your shape will take approximately  $W \times H/2$  bytes of memory.

A box with the specified dimensions will be displayed on the screen with a flashing cursor in the upper left-hand corner. Note that in magnified mode, the dots will be slightly wider than square. A 10 x 10 grid will appear wider than tall, but when converted to high-resolution, it will be square.

## Cursor Movement

To move the cursor, press the I J K M keys, which will move the cursor up, left, right, and down, respectively. The cursor will wrap around the display area. For example, if the cursor goes off the top of the display area, it will appear on the bottom. The same is true for left/right wraparound.

## Plotting and Deleting Points

Pressing the “Z” key lets you plot points and the “X” key turns points off.

## When You Are Done

Press RETURN when you are through. The shape will now be shown in actual size on the high-resolution screen. Skip to “Manipulating the Shape,” below.

## Creating Shapes in Actual Size

### Cursor Movement

Use the I J K M keys to move up, left, right, and down respectively. Your cursor starts in the middle of the screen (although you can’t see it until you move it).

### Plotting

Pressing the “Z” key turns plotting on, and the “X” key turns the plotting off.

## Manipulating the Shape

After you have created a shape in either magnified or actual size, you can rotate and scale it.

### Rotation

Pressing the left arrow key rotates your shape clockwise and the right arrow key rotates the shape counterclockwise. (These are represented by the prompts < and >, but refer to the arrow keys).

The shape is rotated in increments of 4, shown on the second options line after the word ROTATION. With Applesoft shapes, 64 units of rotation corresponds to 360 degrees, so each movement of 4 units is 22.5 degrees. With Applesoft shapes, the number of points of rotation corresponds to the scale (see Scale). Shapes with a scale of 1 will only rotate 45 degrees, and therefore will only be affected on the screen with each TWO presses of an arrow (twice 22.5 is 45 degrees).

Applesoft shapes rotated in other than 90 degree increments will have a slightly distorted scale. That is because there is no way to represent the same units of distance at other rotations on a rectangular grid.

## Scale

In scale mode, pressing the right arrow key makes the shape larger and pressing the left arrow key makes the shape smaller. You cannot make the shape smaller than its original size. The second options line will display the scale value. You will always start with a scale of 1, and the numbers will increment by ones.

You may switch between rotate and scale modes by pressing "(R)otate" or "(S)cale." The third options line will tell you the current mode.

## Moves Left

This number is shown only if you are creating a shape in actual size. It will let you know how much space you have left in your shape table. Room is set aside for 12115 bytes in each table. In general, a byte will contain information for two points of a shape. So you have room for shapes totaling approximately 24000 points, or, for example, more than 180 shapes of dimension 16 x 16.

## Finishing the Shape

When you are through creating and testing a shape, press RETURN. If you made your shape in actual size, pressing RETURN will put the shape in your shape table, clear the screen, and give you the Shape Program options.

If you had created your shape in the magnify mode, you now will be shown the option of either putting the shape in a shape table or going back to edit the shape you just completed. If you choose edit, you will be shown the shape you were working on in magnified mode again, and you can change it using the same commands as before. After you put the shape in your shape table, you will go back to the Shape Program options.

## Deleting Shapes

You may delete unwanted shapes from your table by pressing "(D)elete," then typing the number of the shape you want deleted. You will then be asked to confirm that you want that shape deleted. If you are not sure of the shape number, see "View Shape."

## Replace a Shape

Type in the number of the shape you want to replace. You can make the new shape in either actual or magnified mode. The new shape will then replace and be stored with the same number of the old shape.

## View a Shape

Pressing “(V)iew” lets you view one of the shapes in the table in memory. Type in the number of the shape you want to see. You have the same rotation and scale options as listed earlier in this chapter.

## Keep Table

When you are finished with the table in memory, you may save it onto your data disk by pressing “(K)eeP Table.” Be sure your data disk is in the proper drive, type in the name you want to give your table, then press RETURN. Shape tables have the suffix “.SHP” appended to their names as identifiers.

You can add to the table later on by using the “(G)et table” command from the Shape Program options.

## New Table

You may clear the current table from memory by typing “(N)ew Table.” Be sure the table you are using is saved onto your data disk if you want to keep it.

## Get Table

You can load a previously created table from your data disk by using the “(G)et table” command. Type in the name of your table, and press RETURN. You can only have one table loaded at a time. Loading a new one will replace the first one in memory.

## Plotting Shapes on Pictures

The “(P)lot” option lets you plot shapes from your shape table either on a blank screen or on a screen with a picture loaded onto it. A shape table should be in memory before you press “(P)lot.” Type the number of the shape you want to plot and press RETURN. You will see the following options at the bottom of the screen.

IJKM	Number
Rotation	Scale
Color	Z - Plot
Options	ESC

Below the options is a line which tells you whether the left and right arrow keys will affect rotation or scale. Also shown are the standard Apple colors you can use, the number of your shape and your X,Y coordinates. You always start with color #7, white.

## Shape Movement

The I J K M keys move your shape up, left, right, and down, respectively.

## Shape Number

“(N)umber” lets you choose the number of the shape you want to put on the screen. Press a number and then RETURN.

## Rotation

After pressing “(R)otation,” the left and right arrow keys make your shape move clockwise or counterclockwise.

## Scale

After pressing “(S)cale,” the right arrow key will make your shape larger and the left arrow will make it smaller. You cannot make it smaller than the original size.

## Color

You can choose from the following standard Apple colors:

0 - Black	1 - Green
2 - Violet	3 - White
4 - Black	5 - Orange
6 - Blue	7 - White

After you press a number you return to the Drawing Screen. When you plot your shape by pressing “Z,” the shape will be in the color you choose.

## Plotting the Shape

Press “Z” to put the shape at the current location.

## Options

“(O)ptions” returns you to the Shape Program options.

## Full-Screen Graphics

Pressing the ESC key lets you toggle back and forth between seeing the graphics screen with the options lines and full-screen graphics.

## Load Picture

“(L)oad Picture” lets you load a picture onto the screen. Make sure your data disk is in the proper drive, type in the name of your picture, and press RETURN.



## Save Picture

“(S)ave Picture” lets you save the picture that is on the screen. Make sure your data disk is in the proper drive, type a name for the picture, and press RETURN. The picture will be saved in the current format shown, packed or standard 8K. See Format, below.

## Clear Picture

“( ^ C)lear” lets you clear the screen. Make sure you have saved anything you want to keep.

## Catalog

“(C)atalog” lets you look at the file names on your disk. Make sure your data disk is in the proper drive before pressing “(C)atalog.”

## Format

“(F)ormat” lets you toggle between packed and standard 8K format. The current format is shown.

# Chapter 8 - The Hi-Res to Double-Res Conversion Program

This program allows you to take a standard hi-res picture and convert it in one of two ways to double-res. It will read standard format 8K (.PIC) files as well as packed (.PAC) files. This lets you take hi-res pictures you already have and enhance them with 16 pure colors and 256 fill and brush colors.

Here are the Conversion Program options:

Load Hi-Res picture	Save Double-Res picture
Catalog	Menu
Format	

## Load Hi-Res Picture

After you select "(L)oad Hi-Res picture" you will be asked for the name of the file (which will be a .PIC or .PAC file, depending on the (F)ormat setting) you want to convert. Type in the picture name only, and the program will automatically add the proper suffix. Make sure your data disk is in the proper drive. Once the picture is loaded you will see it for a moment.

You will then have the following options:

- Black and white conversion
- Color conversion
- ESC - Full screen
- SP - View hi-res screen
- Disk Options

Now is the time to try a black and white or color conversion to double-res. You can do this as many times as you like without having to reload the hi-res picture; it stays in memory until you are through converting.

## Black and white conversion

When you press "(B)lack and white conversion" you will see your hi-res picture converted to double-res without color compensation. This method of conversion takes the information on the hi-res screen and maps it directly into the double-res screen. In the process colors are often changed to other primary hi-res colors. Unless you are working with a double-res RGB card, you will not actually see true black and white. This type of conversion is best for black and white line drawings that you want to fill using the full double-res palette. You will probably get the best results from converting this kind of hi-res picture.

## Color Conversion

You can convert a hi-res picture to double-res and preserve the colors, with a minor tradeoff. When you choose “(C)olor conversion” the resulting double-res picture you see will look just as it did in standard hi-res with one exception. The rightmost  $3\frac{1}{2}$  dots (or 7 dots in double-res) of each horizontal line are gone!

You may notice that there are  $3\frac{1}{2}$  black dots added to the right of each horizontal line. This is because of the way the double-res video circuitry presents its image to the video screen. For most pictures, the effect will be hard to notice unless you’re looking for it.

## ESC - Full Screen

Pressing ESC lets you see the whole double-res picture that you’ve converted. Press SPACE or any letter key to return to the Conversion Program options.

## SPACE - View Hi-Res Picture

Pressing SPACE shows you the hi-res picture, so that you can compare it to the double-res version you’ve just created from it. Press SPACE or any letter key to return to the Conversion Program options.

## Disk Options

When you have finished converting the hi-res picture, press “(D)isk options.” These will let you save your new double-res picture, catalog the disk, or return to the Main Menu as described below.

## Save Double-Res Picture

After you have converted a hi-res picture, choosing “(S)ave double-res picture” lets you save the new double-res picture in standard 16K format (“.DPM”/“.DPA” files) or packed format (“.DPK”).

## Catalog

If you need to see the file names on your data disk, press “(C)atalog.”

## Menu

Selecting “(M)enu” will return you to The Complete Graphics System’s Main Menu.

## Format

Pressing “(F)ormat” toggles the loading routines between standard 8K image and packed hi-res picture. It also toggles the saving routines between standard 16K image and packed double-res picture.

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# Part II - Three-Dimensional Graphics

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## What is a 3-D Figure?

A 3-D figure, to the computer, is a set of numbered points, given in X, Y, Z coordinates, and a list of pairs of point numbers to connect the lines. When viewed, a figure appears as a set of interconnected lines in space. This is usually called a "wire-frame" drawing.

For example, a cube would be stored as 8 points, with the coordinates of the 8 vertices of the cube. The definition of the cube would also include 12 lines, which tell which points are connected to give the edges of the cube. The information necessary for each line is the starting point number, ending point number, and color. The figure below has a list of points and lines necessary to define a cube.

### A Cube

Points Point Number	X	Y	Z	Lines From	To
1	0	0	0	1	2
2	5	0	0	2	3
3	5	5	0	3	4
4	0	5	0	4	1
5	0	0	5	5	6
6	5	0	5	6	7
7	5	5	5	7	8
8	0	5	5	8	5
				1	5
				2	6
				3	7
				4	8

This information is automatically stored by each of the 3-D programs in a specially formatted 3-D file, with suffix ".TD". This file contains 3-D information only. It is not a "picture." A 3-D file can be loaded into the 3-D Viewing Program, which will display your 3-D figures as images on the Apple graphics screen. These images can be saved as standard pictures, and then edited with the two-dimensional programs, but once an image is saved two-dimensionally, that image can no longer be manipulated in 3-D. Only ".TD" files can be viewed and manipulated in three dimensions. The 3-D Viewing Program also has an option that lets you save a view of an image in a format that will let it be drawn to a plotter.

## Creating and Manipulating 3-D Figures

The key feature of this set of 3-D programs is that you do not have to use coordinates to create a figure. Instead, you may use a 3-D Panel Program that lets you draw 2-dimensional panels that are stored as if they are parts of a 3-D figure. In the 3-D Viewing Program you can then individually manipulate and assemble these panels in 3-D, creating a 3-D figure with true perspective. Everything can be done visually.

A non-computer example of using panels is the construction of a pre-fabricated house. Each of the pieces is a flat, "two-dimensional" panel. By putting all these panels in the proper places, a three-dimensional house is created.

Once in the 3-D Viewing Program, you can rotate any part of your figure on any of the 3 axes, scale any piece, or even distort it along one dimension. New points and lines can be added visually, and you can move your assembled figure any way you want to see it, from any perspective, even from its inside!

## 3-D Coordinates

Although not necessary to use, you may use the 3-D Point Editor to list and edit all the 3-D coordinate points of your figures.

3-D coordinates are expressed in the form of X, Y, and Z values, which give the relationship between a center, or origin, and the point's distance to the left or right (X), up or down (Y), and forward or back (Z).

The X, Y, and Z axes are oriented such that the X-axis goes from left to right across the screen (negative is to the left), the Y-axis goes from bottom (negative) to top (positive) on the screen, and the Z-axis goes from where you sit toward the back of the monitor (negative to positive). The origin, or point (0,0,0), is at the center of the screen, on the screen's surface.

The numbers used as units of distance are only important relative to the distances used in other figures. It doesn't matter if a line is 10 units long, 100 units long, or 1000 units long; the 3-D Viewing Program can make any of those lengths appear the same size on the screen. If line A is 10 units long, and line B is 50 units long, line B will be 5 times as long as line A. They could just as well be 100 units and 500 units.

You may use this flexibility to your advantage. If designing a house, you may want your "unit" of measure to be a foot. You can allow all your distances to be expressed in feet, and all the figures used will be proportional to their proper sizes. On the other hand, if you are creating a representation of something tiny, you could express all your numbers as if they were millimeters, centimeters, or inches. Map representation might use miles or kilometers for their unit scale.

## Combining Figures

A figure may consist of many other figures. Several figures may be loaded into memory at a time. All of them together make up the "whole," or the main figure. If this large figure is now saved, all of the parts, or smaller figures, are saved with it. Even after this figure is loaded back, all of the original, smaller figures may still be referred to by name and manipulated individually.



There is room in your computer's memory for up to 50 figure names (numbered 0-49), 512 points (0-511), and 512 lines (0-511).

When assembling panels (figures created with the Panel Program) in the 3-D Viewing Program, it is strongly recommended that you only use 90 degrees for rotations of your entire figure. Combinations of other angles of rotation are not as easy to reverse, and it is not difficult to lose your reference position. Using 90 degree rotations you can make sure your pieces are fitted properly. You can view your figure from any of six possible directions (front, back, top, bottom, left, and right), yet still easily return to any of those six views. Individual panels, of course, may be rotated however you want for positioning.

# Chapter 9 - The 3-D Viewing Program

The 3-D Viewing Program lets you view and manipulate 3-D figures stored in ".TD" files. Before going on to the programs that let you create 3-D files, you may want to try the Viewing Program with one or two of the figures that we included on the master disk, so as to become familiar with how 3-D figures are depicted and used. The sample files on disk are called CUBE and APPLE. CUBE was created by entering its point and line values in the 3-D Point Editor. APPLE was created by drawing three different panels with the 3-D Panel Program. One was a vertical cross-section view, another was a horizontal cross-section, and a third was the stem. The cross section views were loaded several times, and each piece was rotated, scaled, and moved into its place to create the final figure.

Following are the 3-D Viewing Program options:

Load	View	Save
Clear Memory	Delete Figure Name	Catalog
Menu	Save Image	Graphics Magician Save
Set Line Thickness*	Picture Format	

\*In double-res version only.

The first thing you must do is load a figure into memory so you can view it.

## Loading a 3-D Figure

Press "(L)oad," type in the name of your figure and press RETURN. (If you do not remember the name of the figure you want loaded, see CATALOG, below).

You are then asked if you want to give the figure a new name. Press RETURN if you do not. This rename option lets you designate new figure names so you can load in more than one of the same figure, then manipulate each separately. For example, you could use "CUBE1," "CUBE2," "CUBE3," and so on. Type in a new name if you want and press RETURN.

## Clear Memory

Press "(CONTROL-C)lear" to clear all figures from memory, if you want to start over. This option will wipe out anything on the screen. (You will have a chance to confirm that is what you want to do).

## Catalog

Press "(C)atalog" to see a list of the file names on your disk.

## Main Menu

Press "(M)enu" to go back to the Complete Graphics System's Main Menu.

## Viewing

When you “load” a figure, it is loaded only into the computer’s memory, not in memory AND onto the screen as in the other programs.

Press “(V)iew” to view the figure you have just loaded. The bottom of the screen will display information about your current status and a list of one-letter commands.

You may press “(H)elp” to see a list of the commands and what they stand for.

R - Rotate

M - Move

S - Scale

D - Distort

CONTROL-A - Control All

CONTROL-F - Control Figure

CONTROL-P - Control Point

L - Add New Line

P - Add New Point

C - New Center

V - Scale View

SPACE - Change Direction

Numbers, - , . - Change Constant

ESC - Full Screen

O - Disk Options

## Manipulations

There are four functions for manipulating a figure: (R)otate, (M)ove, (S)cale, and (D)istort. The DIRECTION and CONSTANT determine how these manipulations will affect the figure. Your current function, direction, and constant are always displayed at the bottom of the screen.

Each time you press the left or right arrow key, you perform the current function, in the current direction with the current constant. For example, “rotate” the figure “up or down” by “10” degrees. The right and left arrows in this instance correspond to up or down.

## SPACE - Change Direction

To change the direction you want your figure to move, press SPACE. Your choices will be displayed on the bottom line. The choices you get will depend on the function — whether you are in Rotate, Move, Scale, or Distort mode. They are listed under each function below.

## Numbers - Change Constant

The number you choose for the constant determines how large or small the change to your figure will be. To change the constant, type a number (any combination of the digits 0-9, a minus sign, and a decimal point). After typing the new constant, press RETURN.

You may change the constant at any time you see the View options just by typing a number, “-” (minus sign) or “.” (decimal point). The program will automatically put them under “constant.”

The number you type for the constant stands for units, degrees, or a multiplication factor, depending on which function you are using. This is listed under each function.

## **O - Returning to the Disk Options**

“(O)ptions” lets you go back to the 3-D Viewing Program options.

## **MANIPULATING THE FIGURE**

### **R - Rotate**

When you choose “(R)otate” the constant is the number of degrees the figure will rotate each time you press the left or right arrow key. The directions for rotating which you see when you press SPACE are:

U/D — up/down

L/R — left/right

C/C — clockwise/counterclockwise

The directions refer to the direction of movement of the part of the figure closest to you. (This is necessary to know, because if the front is rotating upward, the back is moving downward). Depending upon which direction setting you’ve chosen, the left arrow will rotate your figure down, left, or counterclockwise. The right arrow rotates your figure up, right, or clockwise.

If you want a repeated movement with the same constant and direction, just hold down the appropriate arrow key. On some Apple II/s you may have to hold down the REPEAT key while pressing an arrow key.

### **M - Move**

“(M)ove” shifts the figure in the current direction. The constant is the number of units the object will move. The directions you see for movement when you press SPACE are:

U/D — up/down

L/R — left/right

F/B — forward/back

The right arrow moves the object up, right, and forward (towards you). The left arrow moves the object down, left, or back.

## **S - Scale**

“(S)cale” changes a figure’s actual size. In using the scaling function, the constant is the number by which the size is multiplied or divided. Choosing a direction is unnecessary, as the object expands (or diminishes) in all directions.

When you press the right arrow key the size of your figure is multiplied by the constant number. Pressing the left arrow key divides the size of your figure by the constant number. For example, using a constant of 2, the right arrow would double the dimensions and the left arrow would halve the dimensions. A constant of 1 would always keep the figure the same size. For very precise control, use numbers such as 1.1 or 1.001.

## **D - Distort**

When you “(D)istort” a figure, you are actually scaling it in one dimension. Direction does matter here, so press SPACE to see the following choices:

H — Height  
W — Width  
D — Depth

The arrow keys work here the same way as with scaling. Distorting has the effect of stretching or compressing the figure in the specified direction. For example, by distorting a cube you can create a rectangular box of any size.

## **ADDING TO THE FIGURE**

### **L - Adding New Lines**

“(L)ine” allows you to add a line to the figure you have on the screen. After you press “(L)ine,” use the left and right arrow keys to move your cursor around the points of the object. Press RETURN to choose the point you want to draw your line from. Then repeat this step to choose the point you want your line to be drawn to. Pressing ESC will take you back to the Viewing Program options with no change.

### **P - Adding New Points**

After you press “(P)oint” you will be asked to specify the X, Y, and Z coordinates of the new point. Press RETURN after each.

A point with the coordinates of 0, 0, 0 is at the center of the screen horizontally and vertically. Its depth is on the plane of the screen itself.

Points whose X-coordinates have a value of greater than 0 are on the right side of the screen and points with X-coordinates of less than 0 are on the left side of the screen. Y-values greater than 0 put the point above the center of the screen, and a negative Y-value puts the point below the center of the screen. A Z-coordinate that



is positive puts the point away from you — “into the back of the monitor,” so to speak. A negative Z-coordinate means the point is “coming out from the screen towards you.”

Creating a new point does not alter the display. You will only be aware of that point if you draw a line to it.

When creating a new point, you may want to give it a coordinate of 0, 0, 0. Then create a line to that point, and you'll be able to see the point as you manipulate it.

## **C - Changing the Center**

When an object is rotated or scaled, the point that remains stationary is the center. The center of an object is computed to be the **average** of the high and low X values, the high and low Y values, and the high and low Z values.

Rotations turn the object around its center point. Scaling expands the object out from the center.

You can change the center of your **object** the same way you make a new line or point. After you press “(C)enter,” use the left and right arrow keys to move your cursor around the points of the object. Press RETURN to pick the new center, or press ESC to take you back to the **Viewing Program** options with no change.

## **CONTROLLING FIGURES**

### **ΛA - Control All**

You automatically start in this program by being able to control all the figures on the screen. This is noted on the third options line: **FIGURE:ALL**. The figures will all be rotated, moved, scaled, or distorted in the same direction and with the same constant.

To go back to controlling all the figures on the screen after controlling one or a point, press “(CONTROL-A)ll.”

### **ΛF - Controlling One Figure**

If you want to control only one of the figures you have loaded, press “(CONTROL-F)igure.” Type in the name of the figure you want to control and then press RETURN.

If you do not remember the name of the figure you want, press RETURN. Then press the left or right arrow key to see each of your choices. Press RETURN again when the name of the figure you want is shown on the screen.

### **ΛP - Controlling a Point**

“(CONTROL-P)oint” allows you to move one of the already existing points of your figure to another position. All lines attached to that point move with it.

Use the left and right arrow keys to move the cursor around the points of the object. Press RETURN to pick one or ESC to go back to the **Viewing Program** options with no change.

Once a point is selected, use the left and right arrow keys to move the point around the screen. Press SPACE to change the direction controlled by the arrow keys.

## **V - Changing the View Size (Scale View)**

“(V)iew Size” is called “Scale (V)iew not figure” in the double-res version. Both versions work the same. Pressing “(V)iew size” (or Scale (V)iew) lets you scale the view size.

On the screen, this option appears to control the figure similarly to the scale function. However, in “(V)iew Size,” the actual size of the figure is not changed. The figure itself is unaffected.

With the other options in the 3-D Viewing Program the actual coordinates of figures are altered when you alter the figures. Using “(V)iew Size” is more like looking through a pair of binoculars. The object you’re looking at is still the same thing, it’s what you see of it that is different.

This command is also helpful when you want more or less “perspective” in your view of an object. The closer an object is to you, the more pronounced is its perspective. This is similar to holding something directly in front of your eye, as opposed to seeing it at a distance.

To get less perspective, use the “(M)ove” function to move the object further away. Then enlarge it by changing your view with the “(V)iew size” option. To get more perspective, use the “(M)ove” function to move the object closer to you. Then reduce it by changing your view with the “(V)iew size” option.

## **Changing Line Thickness DOUBLE-RES VERSION ONLY**

There are three ways to draw the lines of three-dimensional figures you will be working on. The line thickness option only changes the display that you see, not the actual data making up your 3-D object. The three ways are 560-point resolution with color, 140-point resolution with color, and 560-point resolution without color (white lines only). Usually 560-point resolution with color will look best. This is what you get automatically when you start the program. The 140-point resolution will always draw solid lines, and corresponds to the thick lines in the Drawing Program. 560-point resolution without color is provided mainly for those with RGB cards, and will display your 3-D figure only as true white lines (without any color fringing) on RGB systems. If you are using a composite monitor, this mode will display your figure only as white lines, but you will see the normal color fringing effects.

The line thickness option can be misleading when saving your three-dimensional images. If you “(S)ave” the image as 3-D data, or use the “(G)raphics Magician Save,” the resulting image will appear drawn as it really exists: in 560-point resolution with color. If you use the “(I)mage Save” option (packed or standard 16K), the resulting picture will be exactly what you see on the screen.

If you use the “(G)raphics Magician Save” for use with the Plotter Program only, you don’t need to worry about the line thickness setting. The Plotter Program screens out color information and draws straight, thin lines of one color on your

## Other 3-D View Program Options

### Delete Figure Name

Sometimes you will want to load several figures, assemble them, then want to keep them under just one name, not the names of all of the parts. This option allows you to delete a figure name or names from memory, yet keep all the points and lines intact as part of a larger figure.

From the 3-D Viewing Program options, press "(Delete)," then type in the name you want deleted. If you do not remember or want to check the figure names, press RETURN, then use the left and right arrow keys to see each of the names. Each figure will redraw itself when its name appears. When the figure name shown is the one you want to delete, press RETURN.

The figures whose names you have deleted can now only be controlled when you are controlling a larger figure of which they are a part.

### Saving Your Figure

There are three ways to save what you have created in this program. With all saves, make sure your data disk is in the proper drive. Type in a name under which you want your figure to be saved, then press RETURN.

The first, "(S)ave," saves all the 3-D points, lines, and figure names in memory into a 3-D file with the suffix ".TD". This file can be used with the 3-D Point Editor or again in the 3-D Viewing Program.

We recommend that you save your figure at different steps in its creation. This is useful if you then want to load in more than one figure which has been assembled from other figures. Also, if you make a mistake, just clear the screen, and then load in your figure again.

When the figures in memory are stored on disk, the names of all the figures are also stored as part of the one large figure being saved. When you load this large figure later, you will still be able to manipulate each of the smaller figures of which it was originally made.

### Saving a Picture

You may also save exactly what is displayed on the screen as a two-dimensional picture by pressing "(I)mage," for "save image." When you save a picture this way it can later be loaded with the Drawing, Text, or Tricks Programs. You may not use these pictures again in the 3-D programs. You have the option of saving in packed format or in standard image. Using "(F)ormat" toggles between the two.

### Double-res Version Note

The 3-D Viewing Program is very large. To get everything to fit into memory, it was necessary to "steal" about 4K of RAM from the picture packer's 16K memory buffer. This means you will not be able to save a picture that is so complex that the

packed data exceeds 12K (although we think it is a physical impossibility to create one that complex with this program). If you manage to do so, however, you will get a "Picture too complex" message. Save the picture as a 16K image instead. Then you can load it into the Drawing or Tricks Programs and save it as a packed picture.

## **Saving for Use with a Plotter**

You may save the currently-displayed picture in a special "sequential command" format that allows it to be printed on a plotter. To do this, press "(G)raphics Magician Save." The picture is saved, not as the entire image, but as the directions for the picture to be drawn. They can later be loaded into the special plotter program in this package and reproduced on a plotter.

This way of storing a picture uses much less memory than any other format, even packed, and is the way all pictures created with the Penguin Software's Graphics Magician and Double-res Graphics Magician Picture Painter are stored. Pictures saved this way can be loaded into the Graphics Magician's Picture Editor and edited as a two-dimensional image by adding, changing, and deleting parts using the line, text, color fill, and brush options of The Graphics Magician. Pictures in this format can also be transferred to versions of The Graphics Magician on other computers.

Pictures saved with the "(G)raphics Magician save" in the hi-res version of The Complete Graphics System have the suffix ".SPC" added to them, which stands for "Sequential PiCture." Pictures saved this way in the double-res version of The Complete Graphics System have the suffix .DPC added which stands for "Double-res sequential PiCture."

# Chapter 10 - The 3-D Panel Creator

The 3-D Panel Creator is a program that allows you to draw two-dimensional surfaces, or panels, that are saved in 3-D format and can be used with the other 3-D programs.

A panel is a single two-dimensional figure with three-dimensional coordinates. The Z coordinate (for depth) is assigned a value of 0. The panel is a line drawing, and consists of the information necessary for creating that line drawing in 3-D format.

## Note on Resolution

In the hi-res version there are 280 points across the screen, and 192 points down the screen. In double-res there are actually 560 points across the double-res screen. In order to keep the double-res 3-D programs and data as compatible as possible with the hi-res, the double-res screen is treated as if it had 280 addressable points across. Although you don't gain any flexibility in placing endpoints, the lines are still much finer and colors more flexible in double-res. You can load any 3-D files you have created with hi-res version of The Complete Graphics System and edit them in double-res.

## Creating Panels

The 3-D Panel Creator options are as follows:

Draw Panel  
Catalog

Save Panel  
Menu

First, you will be asked if you want to clear the screen. With the first panel you create, the screen will be clear anyway, so it doesn't matter. With subsequent panels, you may want to keep other panels on the screen for reference. For example, you may want to match sides and sizes with previous panels still on the screen, so that when they are assembled, the parts will fit.

## Scale

The next question asked will allow you to set the scale of the screen. Unless you want to design a panel that is supposed to be much larger or much smaller than other figures you've designed, or want your "units" to match a specific size or measurement, press "(N)o" to keep the scale as it is.

If you answer "(Y)es," then two points will be displayed, and you'll be asked to assign a number to the distance between them. The actual screen distance between them is 20 dots. The distance assigned automatically is 5 units (making the distance from one point to the next  $\frac{1}{4}$  unit). Type in the number you want to be the distance, then press RETURN.



There are 280 points across the screen and 192 points down the screen. With the default of 20 points = 5 units, the screen width becomes 70 units, and the height is 48 units. If you are trying to recreate an object with particular measurements, you should make sure its measurements will fit on the screen. In other words, if its width is 100 feet, and you are using the units as feet, the 100-foot (100-unit) object will not fit across the default 70-unit screen. You could tell the program that 20 points on the screen should be equivalent to 10 units, thus giving a 140-unit wide screen, and leaving enough room.

As another example, suppose that you are drawing the panels and pieces for a house, and the house is 50 feet wide, and it has a 5-foot wide fireplace. When you draw the fireplace, you want to include a lot of detail. All your measurements are in feet, so when we speak of a unit, we'll really be referring to "feet." When drawing the house panels, you may want to leave the default scale of 20 points = units. This gives a 70-unit wide screen, with plenty of room for the 50-unit wide house. But now when you draw the fireplace, since it is only 5 units wide, it will be very small on the screen (only 20 screen points wide, as a matter of fact). For your detailed fireplace panel, you can set 20 points to represent only 1 unit. Now you can draw your fireplace in a much larger size with the Panel Creator, allowing you to add much more detail. And best yet, when you load the house and fireplace panels into the 3-D Viewing Program, they will have the correct relative size! You can assemble them as they should go, and if you zoom in to look at the fireplace, it will be there in all its resplendent detail!

## **Options Lines for Panel Drawing**

The single-letter panel drawing commands are listed on the top options line. Also displayed are two headings which say "POINT -." The one displayed in inverse is always the one which notes the current point number, if any, of the flashing cursor. The one not in inverse shows the point number of the other cursor, if it has a number already. Below that are the X and Y coordinates of the corresponding cursor. Control is switched between the two cursors by pressing SPACE. The appropriate "POINT -" heading will then be shown in inverse.

Below those lines are the distance between the cursors and the number of the current drawing color.

## **IJKM/ARROWS - Cursor Movement**

You are in control of the cursor that is blinking. In the hi-res version the I J K M keys move the cursor up, left, right, and down, respectively. In double-res, use the arrow keys.

## **1 to 9 - Movement Length**

Pressing number keys 1 through 9 set the distance (in screen points) the cursor will move each time you press one of the direction keys (I J K M or arrows). Pressing "1" makes the cursor move only one dot at a time, pressing "2" lets you move two dots at a time, etc. Your choice will remain in effect until you specify another number.

There may be times when it appears you can't get to an edge of the screen. If this happens, set the movement length to 1 and continue to the edge of the screen.

## **SPACE - Switch Cursor Control**

"SP" on the commands line stands for SPACE. Pressing SPACE lets you shift control back and forth between the two cursors. You are in control of the cursor that is blinking.

Each time you press SPACE, you also update the coordinates shown of your cursors and the distance between them.

## **ESC - Full-Screen Graphics**

Pressing the ESC key lets you toggle back and forth between the graphics screen with the options lines at the bottom and full-screen graphics.

## **L - Drawing Lines**

Pressing "(L)ine" lets you draw a line between the two cursors on the screen. When a line is drawn, the stationary cursor moves to the position of the flashing cursor you were controlling.

You will notice on the second options line that after "POINT" a number appears. This is the number assigned to the point you have drawn to. Each time you draw a line, each end point is numbered consecutively. If one or both of the cursors are on previously numbered points, new numbers will not be assigned. If a cursor is not on a previously numbered point, "." will be displayed as the point number.

## **P - Selecting a Previous Point**

If you want to move a cursor back to a previous point, type "(P)oint." The flashing cursor will move to the first point made. Press the left or right arrow key until it moves to the point where you want your cursor, then press RETURN.

Using previously-defined points instead of new ones saves space and lets the 3-D routines run faster.

## **D - Distance and Coordinate Update**

To update the coordinates and distance, press "(D)istance." The distance between the cursors is given according to your scale.

## **C - Line Color**

Lines will be drawn with the color number displayed. To change colors, press "(C)olor" to see your choices. Press the number of the color you want. White gives you the best resolution. If you choose black, you won't be able to see the lines you draw on the screen.

## **H - Help Screen**

Pressing "(H)elp" lists the commands available to you and what they do. Press SPACE to go back to the panel screen.

## **O - Options**

Pressing "(O)ptions" will take you back to the 3-D Panel Creator options. First, however, you are asked to verify that you are done with the panel on the screen. Pressing "(N)o" lets you go back to the panel screen where you were. Pressing "(Y)es" takes you to the 3-D Panel Creator options.

## **Saving the Panel**

"(S)ave" lets you save the panel you created. Make sure your data disk is in the proper drive, type in a name, and press RETURN. The suffix ".TD" (for Three-Dimensional) is added automatically to file names.

## **Catalog**

"(C)atalog" lets you see the names of the files on your disk. Be sure the disk you want to catalog is in the proper drive.

## **Menu**

Pressing "(M)enu" returns you to the Main Menu of The Complete Graphics System.

# Chapter 11 - The 3-D Point Editor

This program lets you edit a 3-D figure by changing the coordinates' points, changing the endpoints of lines, adding and deleting points and lines, and changing colors. You can even create a figure directly by typing in its coordinates.

Following are the 3-D Point Editor options:

Load	Edit Figure
Save	Catalog
Delete Figure Name	Add Figure Name
Print Figure Information	Clear Memory
Menu	

Below the options is listed the number of figures in memory.

Unless you want to create a figure using coordinates, you should load a figure into memory before editing.

## Loading a Figure

Press "(L)oad" from the 3-D Point Editor options. You will be asked for the name of the figure that you created with any of the 3-D programs. Type in the name, make sure your data disk is in the proper drive and press RETURN.

You will then be asked if you want to give your figure a new name. You would do this if you wanted to load more than one figure with the same name into memory and then be able to access each figure individually.

After you have loaded the figure you will automatically return to the 3-D Editor options. When you load the figures into memory, the program will number all of the figures' points in the order in which you load them.

## Add Figure Name

Adding a figure name is the first thing you would do to create a figure by typing in its coordinates. In most instances, you will want to make sure that no other figures are already in memory. When you save, all the figures in memory get saved under the name of one large figure (although each of the individual figure names can be used to manipulate that part of the larger figure).

After you press "(A)dd Figure," type in the name you want to give it. A figure will then be created which has one point with the coordinates 0, 0, 0. The figure will have one "line" going from point 0 to point 0 and the color of the line is 0.

You can then add points and lines to your figure as described below, in Edit.

## Edit

Press "(E)dit," then type in the name of the figure in memory you want to edit and press RETURN. If you want to see the names of the figures in memory, press RETURN when the one you want to edit shows on the screen.

After you have selected a figure, the coordinates of the first 20 points of that figure will be displayed. At the top of the screen are the available commands, then the first five letters of the figure name and its point numbers. Below this are the numbers of the points and their X, Y, Z coordinates. Your cursor is shown as an inverse block.

## **IJKM/Arrows - Cursor Movement**

In the hi-res version use the I J K M keys to move up, left, right, and down. Use the arrow keys in the double-res version. These direction keys take you from number to number and when you go to the bottom of the screen, points beyond the first 20 will be shown. When you move past the last point or line, a new one will be added with zeroes for the coordinates, color, or point numbers.

If you have a very large figure, instead of using the direction keys (IJKM or arrows) press "(P)oints" or "(L)ines" to get the cursor back to the beginning.

RETURN also works for cursor movement, taking you to the leftmost entry on the next line down. If you press RETURN after you have come to the end of the point of your figure, another point or line will be added with zeroes for the coordinates, color, or line numbers.

## **P - Point Editing**

When you go to edit a figure, you will automatically be shown the points of the figure first. In the first column is the point number. The second, third, and fourth columns show the points' X, Y, and Z coordinates.

Use the direction keys and RETURN to move the cursor to the number you want to change. Then type in the number you want in its place. For the coordinates, you may use each number symbol (1-9), the decimal point (.) and the minus sign (-).

If you switch to editing lines, you may go back to points by pressing "(P)oints."

## **L - Line Editing**

Pressing "(L)ines" will allow you to edit the lines of the figure. You are shown the line numbers, colors, and the starting and endpoint numbers.

Use the direction and RETURN keys to move the cursor to the number you want to change. Then type in the number you want in its place. You may make the line color any of the eight primary hi-res Apple colors (0-7) or the 16 primary double-res colors (0-15).

## **D - Deleting a Point or Line**

If you want to delete a point or line from the figure, position the cursor over any one of the X, Y, or Z coordinates of the point or one of the endpoint numbers for the line and press "(D)elele." You will be asked to confirm if that is what you want to do. After the point is deleted, all of the subsequent points or lines and their information will be moved up one number.



## **O - Options**

Press “(O)ptions” to return to the 3-D Points Editor options.

## **Delete Figure Name**

Press “(D)delete” from the 3-D Editor options to delete a figure name. You will be asked to confirm that you want it deleted. Deleting figure names works the same way as it does in the 3-D Viewing Program.

## **Catalog**

“(C)atalog” lets you see the names of the files on your disk.

## **Clear Memory**

If you want to clear all the figures from memory press “(CONTROL-C)lear.” You will be asked to confirm if that is what you want to do. Press “Y” if you do, “N” if you don’t, or RETURN to go back to the 3-D Points Editor options.

## **Save Figure**

Press “(S)ave” and type in the name you want to give your figure. The suffix “.TD” is automatically added to the file name.

## **Print Figure Information**

This option lets you print the coordinate information on your printer. You can print one figure or all that you have loaded. If you only want to print one, type in its name and press RETURN. You may also just press RETURN for the name, and use the arrows and RETURN to select the figure name from the prompts.

Then type the slot number your printer is attached to. Usually this is slot 1. (It should always be 1 with an Apple //c).

## **Menu**

Press “(M)enu” to return to the Main Menu of The Complete Graphics System.

# Chapter 12 - The Plotter Program

From The Complete Graphics System's Main Menu, press "p(L)otter program." You may use the Plotter Program if you have saved a 3-D view using the special "(G)raphics Magician save" in the 3-D Viewing Program and if you have one of the plotters supported. The Plotter Program works with Apple, Amdek and Houston Instruments plotters.

You may also use the Plotter Program to plot pictures created with the picture editor of The Graphics Magician or The Graphics Magician Picture Painter, however, fill and brush commands will not be plotted.

These are the Plotter Program options:

Load Picture	Print Picture to Plotter
View Picture	Catalog
Menu	

## Load Picture

First press "(L)oad" to load a sequential picture for plotting. This is a picture with a suffix of .SPC in the hi-res version or .DPC in double-res.

## Print Picture to Plotter

Choose if you want to plot the picture in small or large size. Small pictures are formatted to fit on 8½" by 11" paper. Large pictures fit 11" by 17" paper. Any other special instructions will be given to you on the screen. As soon as you select "1" or "2" for large or small, the plotter will start drawing your picture.

## View Picture

If you want to see the graphics screen again, press "(V)iew Picture."

## Catalog

"(C)atalog" lets you see the file names on your disk.

## Menu

"(M)enu" returns you to The Complete Graphics System's Main Menu.

# Appendix A - Color on the Apple

## Standard Hi-Res Graphics

At some point in using the Apple, you will probably notice that some colors tend to “bleed” over onto others when they are placed side by side. This is because of the way the colors and points on the screen are stored.

The standard Apple colors are:

0 — black	4 — black
1 — green	5 — orange
2 — violet	6 — blue
3 — white	7 — white

Any single horizontal row of points on the screen is divided into sets of seven dots. In any of these sets, you can have colors 0-3 or 4-7, but not any mixture between the two groups. Green (1) does terrible things next to orange (5) or blue (6), orange does nasty things to green and violet (2) and so on.

One of the most important considerations is that the two whites and two blacks will act differently on your drawing. Black (0) and white (3) will work well with green (1) and violet (2), however, they will bleed into orange (5) and blue (6). The opposite is true for black (4) and white (7).

Another color restriction with the Apple is that colors other than black and white may only appear in even and odd (every other) column. So those other colors — green, violet, orange, and blue — have only half the resolution. Vertical lines in the wrong column will not appear if they’re in the wrong color.

## Blended Colors

To create the illusion of additional colors, we blended the existing six colors in various combinations of up to four each. These are the blended colors you see on the palette (shown on the back of the package, also). These blended colors are divided into three groups: A, B, and C. Group B is blended exclusively from standard Apple colors 4-7. Group C is blended exclusively from standard Apple colors 0-3. Group A is always a combination of some colors from standard Apple colors 0-3 and some from standard colors 4-7.

## Color Groups on the Palette

It is important to note that the three color groups are divided on the palette. You’ll notice three separate whites. Each is actually different internally and EACH WHITE MARKS THE BEGINNING OF A COLOR GROUP.

The colors are in order in vertical columns. For reference, see the back outside cover of your package where they are numbered. The first (vertical) column is 0-9, the second, 10-19 and so forth up to 107.

The first color group (group A) starts with the white at the upper left corner (#0) and includes the colors in the columns down to the next white in the 6th column. -69-

Color group B starts with that second white (white #52) and consists of the colors down to the last white in the 8th column. Color group C starts with the last white (#77) and includes all of the rest of the colors on the palette. Color group B can be used with the standard Apple colors 4-7, if needed (for example, with the Shape Program). Color group C can be used with the standard Apple colors 0-3.

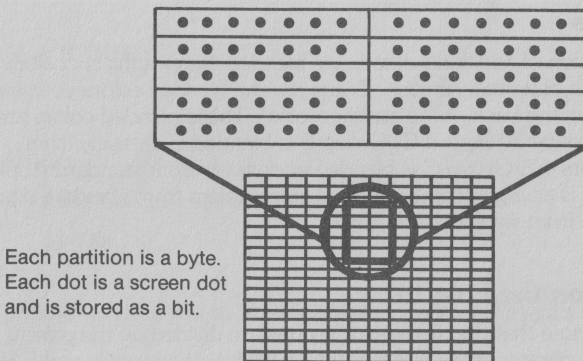
The colors in each group will not bleed into other colors in the same group when they are placed next to each other vertically on the screen. Only when they are placed next to each other horizontally will they cause problems.

Several of the colors appear in at least two of the color groups. Although they appear the same, they are stored differently internally. This allows you to have the same color appear with colors from group A and elsewhere with colors from group C, for example.

We recommend that if you use more than one color group, you set up your screen in horizontal zones. For example, have group B use the top third of the screen, group A use the middle third, and group C use the bottom third. This way, you'll reduce the possibility of any accidental color bleeding.

## Double-Res Graphics

To fully take advantage of the double-res color graphics ability, it helps to know just how those colors are stored on the double-res screen. Figure A.1 shows a magnified portion of the graphics screen. Each dot corresponds to a dot that may be on or off and each is technically stored as a bit. The lines divide the basic storage units on the Apple, bytes. Each byte consists of seven bits displayed horizontally on the screen. The eighth bit in each byte, used as a color-select bit in standard hi-res, is ignored in double-res. When the 8K main memory is displayed simultaneously with the 8K auxiliary memory, we get a screen that is 80 bytes, or 560 dots, wide. As with standard hi-res, the screen is 192 bytes, and dots, tall.



Each dot may only be on or off. An "on" dot may be one of four colors, depending on its horizontal position on the graphics screen. For color purposes, the 560 dots going across the double-res screen are divided into groups of four dots. This unit of four dots, or "color group," is capable of 16 combinations, or 16 colors. See figure A.2.

	Color Group
Black	0 0 0 0
Magenta	0 0 0 X
Brown	0 0 X 0
Orange	0 0 X X
Dark Green	0 X 0 0
Grey 1	0 X 0 X
Light Green	0 X X 0
Yellow	0 X X X
Dark Blue	X 0 0 0
Violet	X 0 0 X
Grey 2	X 0 X 0
Pink	X 0 X X
Blue	X X 0 0
Light Blue	X X 0 X
Aqua	X X X 0
White	X X X X

X = on                      0 = off

Figure A-2 - Double-Res Colors

This new color layout has a few interesting results. First, black and white mode is basically dot on and dot off. "White" means a dot is on, without regard to actual color and "black" means a dot is off, and will always be black. The actual resolution of this mode is 560 by 192.

The second result is that, like standard hi-res, the color mode resolution is really only 140 by 192. There are 560/4, or 140 color groups across the screen, and each color group can only produce one color at a time. This is not as severe as it sounds, because most graphics you produce will be some mixture of the "black and white" 560-dot resolution and the color 140-dot resolution. Most computers require that you choose either one or the other display mode, with very limited mixture, if any.

The third result is that there is no such thing as color bleed in double-res. The color-select bit is not used, so you may freely place any color next to any other color without fear of affecting other colors within the byte boundaries.

The final result is that, unlike the standard hi-res version of Complete Graphics System, there are no "group A, B, and C" colors on the two color palettes. You may mix color fills any way you want. Of course, if you create a picture in 280-mode, and wish to use it with the standard hi-res PICDRAW, you should observe the limitations of standard hi-res, as described in Appendix B.



# Appendix B - ASCII Character Count

ASCII is a standard number-to-symbol coding that is used by computers. Computers store everything by numeric code. Any computer that uses ASCII will convert the same letters to the same numbers, as given below. The letter "C," for example, will always be represented by the computer with the numeric code 67. There are 128 ASCII character codes, starting at 0 and going up to 127. Codes 0 to 31 are "control codes." These are not printing characters. They are generally used for a special purpose, and most are "typed" by using the CONTROL key like a SHIFT key.

On the Ile and Ilc, if the CAPS LOCK key is down, lower case letters cannot be entered. If the CAPS LOCK key is released, use the SHIFT key for upper case letters.

## Hi-Res Version

Keep your CAPS LOCK key down. See the note about //e and //c use in the Text Program chapter.

## Double-Res Version

You may leave the CAPS LOCK key up or down except when typing in the Text Program.

## ASCII Character Codes - Printed Characters

Code	Character	Ile or Ilc Hi-Res or Double-Res	Il/Il+ Hi-Res	What to Type in Text Program Il/Il+
------	-----------	---------------------------------------	------------------	---

### Hi-Res

32	SPACE	SPACE	SPACE	SPACE
33	!	!	!	!
34	"	"	"	"
35	#	#	#	#
36	\$	\$	\$	\$
37	%	%	%	%
38	&	&	&	&
39	'	'	'	'
40	(	(	(	(
41	)	)	)	)
42	*	*	*	*
43	+	+	+	+
44	,	,	,	,

45	—	—	—	—
46	.	.	.	.
47	/	/	/	/
48	0	0	0	0
49	1	1	1	1
50	2	2	2	2
51	3	3	3	3
52	4	4	4	4
53	5	5	5	5
54	6	6	6	6
55	7	7	7	7
56	8	8	8	8
57	9	9	9	9
58	:	:	:	:
59	;	;	;	;
60	<	<	<	<
61	=	=	=	=
62	>	>	>	>
63	?	?	?	?
64	@	@	@	@
65	A	A	A	ESC A
66	B	B	B	ESC B
67	C	C	C	ESC C
68	D	D	D	ESC D
69	E	E	E	ESC E
70	F	F	F	ESC F
71	G	G	G	ESC G
72	H	H	H	ESC H
73	I	I	I	ESC I
74	J	J	J	ESC J
75	K	K	K	ESC K
76	L	L	L	ESC L
77	M	M	M	ESC M
78	N	N	N	ESC N
79	O	O	O	ESC O
80	P	P	P	ESC P
81	Q	Q	Q	ESC Q
82	R	R	R	ESC R
83	S	S	S	ESC S
84	T	T	T	ESC T
85	U	U	U	ESC U
86	V	V	V	ESC V
87	W	W	W	ESC W
88	X	X	X	ESC X
89	Y	Y	Y	ESC Y
90	Z	Z	Z	ESC Z
91	[	[		ESC 0
92	]	]		ESC 1

93			SHIFT M	ESC 2
94	~	~		or ESC 3
95	—	—		ESC 4
97	a	a		A
98	b	b		B
99	c	c		C
100	d	d		D
101	e	e		E
102	f	f		F
103	g	g		G
104	h	h		H
105	i	i		I
106	j	j		J
107	k	k		K
108	l	l		L
109	m	m		M
110	n	n		N
111	o	o		O
112	p	p		P
113	q	q		Q
114	r	r		R
115	s	s		S
116	t	t		T
117	u	u		U
118	v	v		V
119	w	w		W
120	x	x		X
121	y	y		Y
122	z	z		Z
123	(	(		ESC 5
124				ESC 6
125	{	{		ESC 7
126	~	~		ESC 8
127	#	DELETE		ESC 9

## Control Characters

Differences in the double-res version of the Text Program are noted with an \*.

Code	What to Type	Text Program	Other Meanings
0	CONTROL @		
1	CONTROL A		
2	CONTROL B		
3	CONTROL C	Color	Break from Program
4	CONTROL D	Destructive	Precedes DOS commands from BASIC
5	CONTROL E	//e Keyboard * not applicable	

6	CONTROL F	1 dot left * not applicable	
7	CONTROL G	1 dot right * not applicable	Beep
8	© or CONTROL H	Help * Cursor Left	Backspace
9	TAB or CONTROL I	Cursor Up * not applicable	Horizontal Tab
10	v or CONTROL J	Cursor Left * Cursor Down	Line Feed
11	^ or CONTROL K	Cursor Right * Cursor Up	Vertical Tab
12	CONTROL L	Large Type	Form Feed
13	RETURN or CTRL M	Cursor Down * not applicable	"Carriage" Return
14	CONTROL N	Nondestructive	
15	CONTROL O	Options	
16	CONTROL P		
17	CONTROL Q		
18	CONTROL R	Reverse	
19	CONTROL S	Small	Pause Listing or Run
20	CONTROL T	1 dot up * Cursor Right	
21	£ or CONTROL U	1 dot down * not applicable	
22	CONTROL V		
23	CONTROL W		
24	CONTROL X	X spacing	
25	CONTROL Y	Y spacing	
26	CONTROL Z		
27	ESC	Full Screen or Shift	

# Appendix C - Converting Fonts and Packed Pictures from Earlier Penguin Software

If you used earlier versions of **The Complete Graphics System II** or **Special Effects**, there are two types of files in which there has been a change in format. Type sets, or fonts, used to have the suffix ".FNT" for both small and large fonts. Now they have the suffix ".STS" for small type sets, and ".LTS" for large type sets. The format in which they are stored is also slightly different. A new, more efficient picture packing routine has also been incorporated into this new **Complete Graphics System**. It is, however, incompatible with the older packing routine. The old one used the suffix ".PAK". The new packer uses the suffix ".PAC".

## Font Converter

You can convert any of your old fonts that you created with the original **Complete Graphics System** by using a program on your new master disk called "FONT.CONVERTER". You may also use this to convert fonts from the **Additional Fonts and Character Sets** package. Alternately, the fonts from that package are now all included in **Additional Type Sets**.

To use FONT.CONVERTER, "(Q)uit" **The Complete Graphics System** from the main menu and type "RUN FONT.CONVERTER". You will be prompted for the location of your source disk (the one holding the original fonts), and your destination disk (holding your converted fonts). Use "D1" or "D2" for drive 1 or drive 2, or any of the other options given for modifying your master and data disks. If you have only one disk drive, use "D1" for both; you will have to exchange disks before and after each conversion.

The program will ask if you want to convert a large or small font, and ask for the font name. You do not have to add the suffix. That is done automatically. After each font is converted, the program will save it in the new format onto your data disk with the appropriate suffix.

## Packed Picture Converter

You can convert old format packed pictures to the new format with the program PACK.CONVERTER. To use this program, "(Q)uit" **The Complete Graphics System**, and type "RUN PACK.CONVERTER". The program will ask for the location of your source and destination disks, just as with the FONT.CONVERTER. After this, you will be asked for the name of each packed picture you want converted. The program will display the original picture length, the old packed length, and the new packed length, then save the new file with the suffix ".PAC" onto your destination disk.



# Appendix D - Programmers' Notes

## Standard Hi-Res

### Binary Transfer Routine

Included on your **Complete Graphics System** disk is a program called BINTRAN. This is a Binary File Transfer Program. With BASIC files, you can easily load them from one disk, then save them to another. With binary files, such as pictures, shape tables, and machine language routines, it is not as easy. You must know its starting address and exact length. You can use the file transfer program from your DOS master disk, or the Binary Transfer Program will also let you transfer these files. "(Q)uit" **The Complete Graphics System** from the main menu and type "RUN BINTRAN". With it you may load a binary file, and it will tell you the address and length. You can then put in another disk and save the file automatically to that disk. Whenever you type names of files in this program, you must use the full name, including any suffix.

### Using Standard Pictures

To use a picture in another program, you must first set the display for showing hi-res graphics, and then use a binary load command to get the picture from disk. Here is an example with a sample picture file called HOUSE. Be sure to type the quotation marks here, and replace HOUSE with the name of your picture.

```
10 HGR
```

```
20 POKE-16302,0
```

```
30 PRINT CHR$(4) "BLOAD HOUSE.PIC,A8192"
```

Line 10 sets the hi-res graphics display. Line 20 is a POKE that clears the bottom four lines of text. It is optional, but without it you will have text at the very bottom of the screen. Line 30 is the binary load command.

If you have a long program that has a lot of variables or uses large arrays, you may have to add the program line:

```
5 LOMEM: 16384
```

to protect the graphics memory area from being overwritten by the variables.

### Using Packed Pictures

To use a packed picture, you must first put the unpacking routine onto your data disk, then load it into your program, load your packed picture file, and call the unpacker.

To put the UNPACKER on your disk, RUN BINTRAN, load UNPACKER, put in your disk, and save UNPACKER. The following program unpacks a packed picture called HOUSE:

```
10 HGR
```

```
20 POKE-16302,0
```

```
30 PRINT CHR$(4) "BLOAD UNPACKER,A16384"
```

```
40 PRINT CHR$(4) "BLOAD HOUSE.PAC,A16640"
```

```
50 POKE 0,0 : POKE 1,65
```

```
60 CALL 16384
```

You may binary load UNPACKER at any address. That is also the address at which you should call it (we have used 16384 as an example in lines 30 and 60).

You can also binary load your packed file anywhere in memory, but then you must -77-

POKE its address into locations 0 and 1 (see lines 40 and 50). To compute POKes for the address, you should POKE into 1 the address divided by 256 (drop the remainder, so that the value you POKE is an integer). POKE into 0 the remainder of that division.

You may have the UNPACKER unpack to graphics page 1 or page 2. It automatically unpacks to whichever page is displayed (page 1 if you used HGR, page 2 if you used HGR2).

You can also control this with the following POKes:

POKE 230, 32 makes unpacking go to page 1

POKE 230, 64 makes unpacking go to page 2

## Cat Graphics

Many of the actual machine language routines, such as the fill routine, magnify routines, and line routines are not easily accessible from **The Complete Graphics System** to use in your programs. Many of them are interrelated, and they do not load easily at any given address. They are available for use from BASIC in a program written by David Shapiro called **Cat Graphics**, from Penguin Software. With **Cat Graphics**, you will select the routines you want in your programs, and **Cat Graphics** will create a file of those specific routines for you, all easily called through Applesoft with commands such as &FILL, &PACK, &UNPACK, &CIRCLE, and so on.

## Using Shape Tables

To use a shape table in your program, you should binary load it into your program, and then you can use any of the shape commands that Applesoft BASIC offers, such as DRAW, XDRAW, HCOLOR, ROT (rotate), and SCALE. Remember, first you should set the hi-res graphics screen, and there are two POKes that you must use prior to using your shape table.

10 HGR

20 POKE-16302,0

30 PRINT CHR\$(4) "BLOAD THINGS.SHP,A16384"

40 POKE 232,0 : POKE 233,64

50 Rem Okay, now you can use the shape table

The address in line 30 can be any available area in memory, and the POKes in line 40 must correspond to that address. The POKE to 233 should be the integer part of the address divided by 256. The POKE to 232 should be the remainder of that division.

Instructions for use of the Applesoft shape commands can be found in your Applesoft BASIC manual.

## Using the Text Routine

The Text routine in **The Complete Graphics System** can be used, but it is not relocatable, and will require a few steps to use. There is a text routine in **Cat Graphics** that you may find easier to use.

The Text routine occupies locations 24576 to 25855. The small type set occupies 25856 to 26623, and the large type set occupies 26624 to 29695. To use the Text routine in your programs, you must first put it on your own disk, along with at least

one type set. Use the Binary Transfer Program to transfer TEXT to your disk, as well as at least one of the type sets, SMALL.STS or LARGE.LTS, or one of your own.

To call the Text routine, you should first use six POKEs. The only ones that should be done for each letter are the X, Y location, and the ASCII value of the character.

POKE 24576, color	"color" should be a number 0-107
POKE 24577, ascii	"ascii" is the ASCII value of the character to plot, and should be in the range 32-127
poke 24578, xhi	"xhi" is the location divided by 256. It will be "1" if $x > 255$ , or "0" if $x < 256$ .
POKE 24579, xlo	"xlo" is the remainder of the x location divided by 256. It will be the same as the x location if $x < 256$ , or $x - 256$ if $x > 255$ .
POKE 24580, mode	"mode" is 0 for reverse, 1 for nondestructive, 255 for destructive.
POKE 10, y	"y" is the y location.

The calls are CALL 24666 to plot a small character, and CALL 24696 to plot a large character.

### 3D File Format

It is possible for programmers to have their own programs generate 3-D files. The subroutine listed below will write a 3-D Apple text file. Note the variable meanings. You must have assigned values to all the variables before calling the subroutine.

```
1000 PRINT CHR$(4) "OPEN name.TD"
1010 PRINT CHR$(4) "WRITE name.TD"
1020 PRINT NP : PRINT NL : PRINT 1
1030 FOR C = 1 to NP
1040 PRINT X(C) : PRINT Y(C) : PRINT Z(C)
1050 NEXT
1060 FOR C = 1 to NL
1070 PRINT SP(C) + CL(C) * 512 : PRINT EP(C)
1080 NEXT
1090 PRINT CHR$(4) "CLOSE name.TD"
1100 RETURN
```

NP	number of points
NL	number of lines
X(C)	x-coordinate of point C
Y(C)	y-coordinate of point C
Z(C)	z-coordinate of point C
SP (C)	starting point number of line C minus 1 (points are actually numbered 0 to NP-1)
EP(C)	ending point number of line C minus 1
CL(C)	color of line C (0-7)

# Appendix E - Programmer's Notes - Double-Res

## Binary Transfer Routine

Included on the hi-res side of the Complete Graphics System disk is a program called BINTRAN. If you last booted the hi-res version, you may use BINTRAN for the files created with that hi-res version.

You must not boot the double-res version, and then use the BINTRAN program from the hi-res version. Nor should you ever try to use hi-res BINTRAN on any double-res program files.

There is a solution, though. If you have an Apple DOS 3.3 System Master, BRUN FID from that disk. Using FID, transfer a copy of FID itself to the backup of the double-res version of the Complete Graphics System. (Instructions for using FID are in the DOS 3.3 manual). FID now needs a modification to work with 64K DOS.

Quit the FID program, put the double-res Complete Graphics System in the drive, and type in the following:

```
BLOAD FID
POKE 2132,169
POKE 2133,120
BSAVE FID,A$803,L$124F
RENAME FID,FID64
```

Now you have a special version of FID that will work with 48K or 64K DOS. Use only FID64 to transfer files while you are working on the double-res Complete Graphics System. You may even want to use it with the hi-res version as well. Our thanks to Cornelis Bongers for pointing out this FID fix.

## Using Double-res Pictures

To use a double-res picture in another program, you must first set the video display to show the double-res page. Here's an example program which does this, using a picture called BLEEN. You needn't type this in; it's on the disk under the name BLEEN LOADER.

```
100 LO = 768:SA = LO + 3: REM "Set call addresses for LOAD and SAVE
105 FOR X = LO TO LO + 41 : READ L: POKE X,L: NEXT : REM "42 bytes long
and relocatable
110 PRINT CHR$(4) "PR#3" : PRINT : REM "Turn on text card
120 HGR : CALL 768: POKE 49246,0: REM "Equivalent of double-res HGR
130 PRINT CHR$(4) "BLOAD BLEEN.DPA": REM "Load Aux image into main
RAM
140 CALL 768: REM "move it to Aux RAM
150 PRINT CHR$(4) "BLOAD BLEEN.DPM": REM "Load Main image
200 DATA 56,176,1,24,160,0,132,60,132,66
-80- 205 DATA 136,132,62,169,32,133,61,133,67,169
```

210 DATA 63,133,63,173,24,192,133,0,141,0,192  
215 DATA 32,17,195,36,0,16,3,141,1,192,96

We are dealing with a short bit of machine language here. All it does is take the main image of the double-res page and move it to the auxiliary image. If you call it 3 bytes higher (at SA instead of LO) it does the reverse, and moves the auxiliary image into the main image area.

This is needed because DOS and BASIC can't access auxiliary memory by themselves. What it enables you to do is load and save pictures, and clear the entire double-res screen. You can put the routine anywhere in available memory by changing the value of LO in line 100.

Note that the usual POKE-16302,0 and POKE-16301,0 commands for full and mixed screen graphics work normally with double-res.

## Using Packed Double-res Pictures

To use a double-res packed picture in another program, you must first put the double-res unpacker onto your disk, then load it into your program, load your packed picture file, and call the unpacker.

You should use FID 64 (see previous page) or another similar file transfer program to get the double-res unpacker onto another disk. The file's name in DUNPACKER, it loads at \$300 (768 decimal) and is not, alas, relocatable.

Here's a short program that loads and uses DUNPACKER. This program is on the Complete Graphics System disk under the name BLEEN UNPACKER. To use it with your pictures, change BLEEN to your picture name followed by ".DPK".

```
100 LO = 768:SA = LO + 3: REM "Set call addresses for LOAD and SAVE
105 FOR X = LO TO LO + 41: READ L: POKE X,L: NEXT : REM "42 bytes long
and relocatable
110 PRINT CHR$(4)"PR#3": PRINT : REM "Turn on text card
120 HGR : CALL 768 : POKE 49246,0: REM "Equivalent of double-res HGR
130 PRINT CHR$(4)"BLOAD DUNPACKER": REM "Load the unpacker
140 PRINT CHR$(4)"BLOAD BLEEN.DPK,A$4000": REM "Load packed
double-res picture
150 POKE 0,0: POKE 1,64: CALL 768: REM "unpack the picture
200 DATA 56,176,1,24,160,0,132,60,132,66
205 DATA 136,132,62,169,32,133,61,133,67,169
210 DATA 63,133,63,173,24,192,133,0,141,0,192
215 DATA 32,17,195,36,0,16,3,141,1,192,96
```

This is practically the same program as BLEEN LOADER, with the exception of lines 130 through 150. You can binary load the packed picture anywhere in available memory. Before you call the unpacker, POKE the address of the packed data into locations 0 and 1, as in line 150.

To compute the POKES for a given address, POKE into 1 the address divided by 256, and POKE into 0 the remainder of that division. For address A, this would be POKE 1,A/256: POKE 0, A-PEEK (1)\*256. Sneaky, but it works.



## RGB and Double-res

A few features of the double-res version have been included mainly for users of double-res RGB peripherals with an Apple //e or //c. These programs support the "mixed mode" RGB display. That means that any byte in the double-res display area with its high bit on (greater than 127 or \$7F) is displayed as color. Bytes with their high bits off (less than 128 or \$80) are displayed as true black and white. This lets you put 560-point text (up to 80 columns) and white and black lines in your picture.

The mixed mode offers you the ability to "program" your display for areas of superfine detail and areas of color, giving you a great deal of control over your picture. This is a powerful feature, and it isn't available in any other mode, or for composite monitors. However, it is important to keep in mind where the black and white and color sections of your picture will be, and try to keep them as separate as possible.

Although the high-bit-on, high-bit-off business may sound just like hi-res graphics, it is different in one important way. In double-res RGB mixed mode, you have two bytes in the display which are side by side on the same line. If the lefthand byte has any of its lower seven bits set (i.e. it's a byte with displayable bits) then the byte to its right must have the same high bit in order to avoid color fringing or dropout.

In this case, fringing means having small bits of color show up over the righthand byte, regardless of whether the righthand byte has displayable bits or not. This happens when the lefthand byte's high bit is zero, and the righthand byte's high bit is one. Dropout means that a bit or bits in the lefthand byte don't get displayed on an RGB monitor. This happens when the lefthand byte's high bit is one, and the righthand byte's high bit is zero.

In the Text program, if you intend to use black text on a white background, or white text on a black background, you can get sharp letters even using 80 columns. Unless you have a true black and white background (see below), you will need to use the destructive text mode. You may also find that you have to type an extra space at the end of each line to avoid fringing.

There are two blacks and two whites possible on an RGB system. In the Drawing Program, if you Clear Screen while in "(B)lack and white" mode, you will get a true, high-bit-off, black and white background. This applies to the whole palette, not just black or white.

Finally, the double-res packer is not really intended for pictures meant to be displayed on an RGB setup. We have tried to optimize it as much as possible, but packed pictures are susceptible to dropout on RGB monitors. (You may have noticed this on the palettes, which are packed pictures stored in auxiliary RAM. The effect is minor, but still there). For this reason we recommend that you use the 16K "(I)mage save" option if you are using an RGB monitor.

For more information, see the manual that came with your RGB peripheral.

# Appendix F - Disk Error Messages

Sometimes you may try to give the program a command it can't execute, and you will be told that there is a disk error. You will then get a message telling you what is wrong that has a number code corresponding to regular Apple disk error messages.

Listed below are error message codes you may get with this program along with what they stand for and what they are caused by.

Disk Error	Stands For	Caused By
4	Write Protected	Write-protect tab on disk. Make sure you are using a backup of your master disk. No information can be stored on the original master and some programs require information to be temporarily stored. Solution: use a notched backup disk.
5	Out of Data	Tried to read data from a 3-D file that wasn't there. Usually leaves a spurious, one-sector file in the catalog. Delete it sometime. Check typing of 3-D file name. Don't type the suffix. Check catalog. Got the right data disk?
6	File Not Found	Typed incorrect file name? Cannot load that file into program because it is wrong type of file? Solution: check the catalog.
7	Volume Mismatch	Tried to specify a volume number for your disk and it did not match that of the disk.
8	Bad Disk Format	Drive door open? Disk not initialized?
9	Disk Full	Too many files on disk. Solution: save files on another disk.

# Appendix G - File Name Suffixes

Below is a listing of the suffixes of the various types of graphics files that you can create with The Complete Graphics System and the programs that can create and read them. The first thing noted after each suffix is whether it is compatible with or added by the hi-res version, double-res version, or both.

**.DPK** - Double-res packed picture.

Double-res. Created by Drawing, Text, Tricks, Standard to Double-res converter, and 3-D programs. Read by Drawing, Text, and Tricks programs.

**.DPA** - Double-res Picture/Auxiliary memory image

Double-res. This file contains half of a standard 16K double-res picture saved by the Drawing, Text, Tricks, and 3-D Viewing programs. Read by Drawing, Text, and Tricks programs.

**.DPM** - Double-Res Picture/Main memory image

Double-res. This file contains the other half of the image in the ".DPA" file.

**.DPC** - Double-res sequential PiCture file

Double-res. Created by 3-D Viewing program. Read by Plotter program. Compatible with The Double-res Graphics Magician Picture Painter.

**.LTS** - Large Type Set

Both. Created and read by Text Program.

**.PAC** - Hi-res PACKed picture

Hi-res. Created by Drawing, Text, Tricks, Shape, and 3-D Viewing Programs. Read by Drawing, Text, Tricks, Shape and Standard to Double-res Conversion Programs.

**.PIC** - Hi-res standard 8K PiCture

Hi-res. Created by Drawing, Text, Tricks, Shape, and 3-D Viewing Programs. Read by Drawing, Text, Tricks, Shape, and Standard to Double-res Conversion Programs.

**.SHP** - SHaPe table

Hi-res. Created and read by Shape Program.

**.SPC** - Sequential Picture Command file

Hi-res. Created by the 3-D Viewing Program. Read by Plotter Program or Graphics Magician picture editor.

**.STS** - Small Type Set

Both. Created and read by the Text Program. Also compatible with The Graphics Magician and the Double-res Graphics Magician Picture Painter.

**.TD** - Three-Dimensional graphics file

Both. Created by 3-D Viewing, 3-D Panel, and 3-D Point Editor Programs. Read by 3-D Viewing and 3-D Point Editor programs. With the exception of color change, compatible between hi-res and double-res versions of the 3-D programs.





